April 1980
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creative computing

the #1 magazine of computer applications and software

Atari 400 vs. Pet

Heath WH-89 — In-depth evaluation

David Levy: Intelligent Games

Reading, Language and Computers:
- Reading Practice
- Readability
- Comprehension
- Sentence Construction
- Adventure in French
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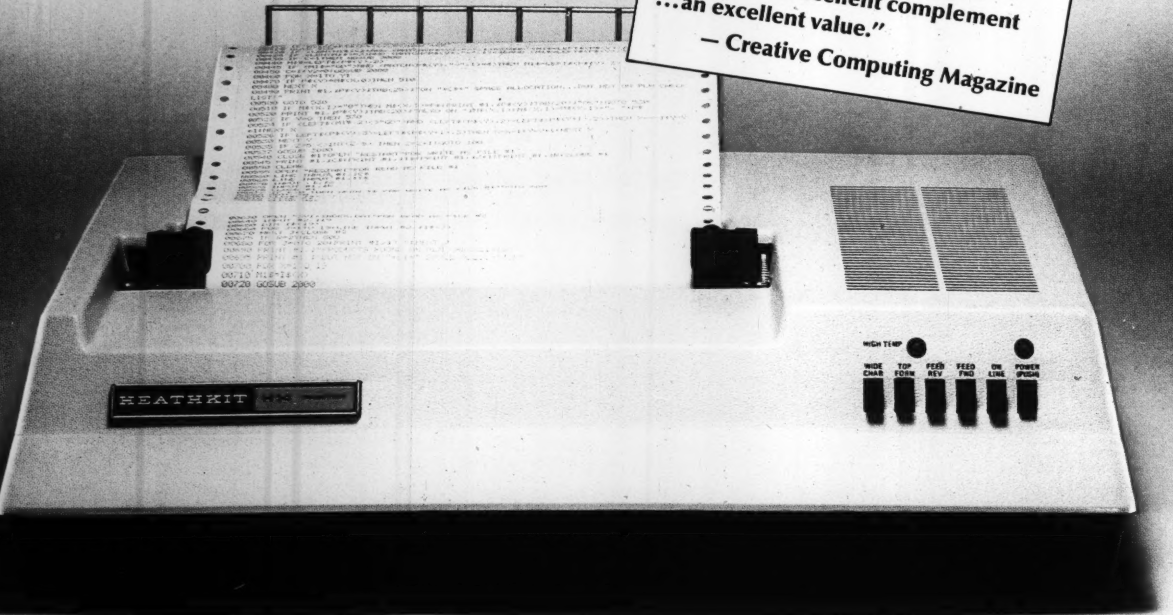

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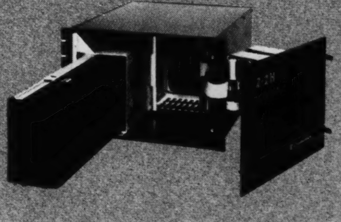

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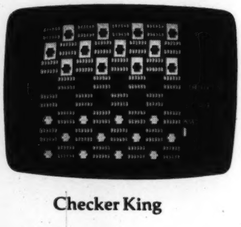

Checker King

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CIRCLE 178 ON READER SERVICE CARD

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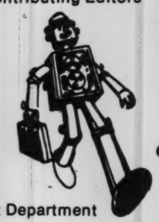

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TERMINAL CONTROL by F. Barry Mulligan is a machine language utility that enables you to use all the potentials of RS-232 tele-communications without hassle. Requiring 16K or more, it can interface to any Level II BASIC or assembly language program, or may be used as a stand-alone system to send and receive entire programs or data. The beauty of this program is that it turns your computer into a truly smart terminal. All RS-232 features can be set from the keyboard and the current values can be displayed or changed at any time. Basic programs can be sent in Level II compressed format for high-speed exchange. Whether you want to send or receive data from a BASIC program, or talk with the computer networks and bulletin boards or with any other terminal or computer or try any of the possibilities that computer communications has opened up, **TERMINAL CONTROL** is your answer. Only briefly described here, this remarkable program sells for only $19.80 on tape and $29.80 on disk.

SYSTEM DOCTOR does a thorough diagnostic check of your entire computer system. It lets you know if something is wrong before you spend time programming or entering data. The program checks the ROM to ensure that every bit is functional and checks the RAM six different ways. The disk drives are tested in a variety of ways to ensure reliability. The cassette recorder is also tested for speed, volume and distortion with the help of a calibration tape provided with the program. The video memory and display are also checked as well as the line printer. **SYSTEM DOCTOR** also does a 12-hour check of the entire system and records the results on tape, disk or the screen. As a bonus, this program also includes the **DISK DRIVE HEAD CLEANER.** The card insert that cleans the head can be obtained free by mailing in the coupon provided. For $28.50, **SYSTEM DOCTOR** is the first complete diagnostic program for the TRS-80. A disk version is available for $38.50.

LINE PRINTER by Dosse Segbeaya is a machine language program that accelerates printing on Centronics printers by making it a background task. Requiring 32K and a disk drive, this program enables the user to set aside up to 16K of memory as buffer which when filled is sent to the line printer while your Basic program continues to run. Any Basic program that uses LPRINT's will run significantly faster with this program. Also included is the ability to set the number of characters per line, the number of lines per page, the spaces between lines, and the left, top and bottom margins. Page numbers can be placed anywhere on the first line starting at any given number. Printouts of anything that is on the screen can also be made by hitting shift/break. If you do programming and you use multistatement lines, **LINE PRINTER** enables you to LLIST your program with single statement lines. This rather amazing program is resident in high memory as it interfaces with almost any Basic program. It sells on disk for $24.50.

LINE PRINTER
SYSTEM DOCTOR
BASIC TOOLKIT
TERMINAL CONTROL
TERMINAL CONTROL PROGRAM
TRS-80

BASIC TOOLKIT by F. Barry Mulligan is a basic programmer's dream come true. Requiring 16K or more, this program has the following features. Variables Map-Gives an alphabetical listing of each variable used, a list of the lines the variables appear on, and shows the number of times the variable appears on the line. Goto X Ref-Lists in numerical sequence the destination of each GOTO and GOSUB statement and the line number that it appears on. Recall-Allows you to recall a program after you have hit reset, accidentally typed NEW or have booted back to DOS. Merge-Enables you to merge tape or disk programs. Test Memory-Does a thorough check of memory to be sure every location is operable. Search Memory-Search for every occurrence of a two-byte combination and list the location where it occurs. **BASIC TOOLKIT** is resident in memory while programming and is accessed by hitting shift/break. A must for basic programmers, this utility sells for $19.80 on tape, $29.80 on disk.

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CIRCLE 114 ON READER SERVICE CARD

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Math & Technology Program

The National Institute of Education (NIE) and the National Science Foundation are initiating a joint program of development and research to improve the teaching and learning of school mathematics through the use of modern information-handling technology.

Primary emphasis on the program is on the development of prototypes of educationally relevant software, instructional courseware, and methods for assessing students' progress. These should respond to pedagogical needs and opportunities, be developed with the involvement of students and teachers and appropriately modified on the basis of experience. Associated research aimed at improving our knowledge of mathematics teaching and learning processes is an essential element in the program.

Two concerns inform the development and operation of this program. First is a need to devise ways of using new information-handling technology to reduce existing inequalities in educational performance. Secondly, the development of prototypes must proceed from the outset with a concern for assuring the successful adaptation of new technology in classrooms.

Mailing of announcements will be hastened if requests are accompanied by two self-addressed adhesive labels.

Science Education Directorate
National Science Foundation
Washington, D.C. 20550
(Telephone: 202 282-7910)

Pet Correction

Greg Yob has sent a correction for the March PET column. On page 161, the first example under "The PET Is Logical" should be:

AND: 1100 If both bits are one, the
0101 result is a one. If they
0100 don't, it gives zero.

Computer Camp

Plans for the fourth annual Camp Retupmoc have been announced by Rose-Hulman Institute of Technology. The program provides an intensive six-day computer workshop intended for college-bound males who have completed their junior year of high school.

Instruction in Basic will be provided along with lectures from computer experts and scientists, some from business and industry, on computer applications. No previous computer experience is necessary for any of the first five sessions to be held June 8-13, June 15-21, June 22-27, July 6-11, and July 13-18. The last camp, to be held July 20-25, is for students with previous experience in programming, and will concentrate on APL.

Contact Dr. John Kinney, Director of Camp Retupmoc, Rose-Hulman Institute of Technology, 5500 Wabash Ave., Terre Haute, IN 47803.

RF Modulator Tip

Personal Computer owners who plan to use their computer with a TV set should be aware of the following: If the tuning of the set is quartz frequency controlled with no user fine tuning, as is the latest trend, the Sup-R-Mod II by M&R Enterprises, and other RF modulators with no provision for tuning, may not work. Use a modulator which has frequency tunability such as the one available from ATV Research, 13th and Broadway, Dakota City, NE 68731.

Thanks to Donald J. Stoner of Cudahy, WI for this information.

Real Estate Correction

For those of you experiencing problems with line 250 of the listing for Real Estate Analysis (p.66, Feb. '80 **Creative**), Mr. Liebman writes that it should read:

```
K=1.+R2(J):L=K↑MO(J):N=M(J)*R2(J)*L
```

In addition, he points out a problem with line 1150 which should read as follows:

```
IF JFLAG<>2THEN GOTO 1180.
```

Language Symposium

The Vassar College Cognitive Science Group will hold a two-day symposium, April 25 and 26, 1980 at the Vassar campus in Poughkeepsie, New York. The symposium will be devoted to an exploration of the role which context plays in perception and interpretation of language. Context will be considered from the points of view of social, perceptual, intentional, linguistic, and computational analysis and the ways in which they are related.

Participation in the conference will be limited to the first 150 people who preregister.

Please contact: Cognitive Science Symposium, Vassar College, Box 525, Poughkeepsie, NY 12601 USA, (914) 452-7000, ext. 2407.

S-100 Magazine

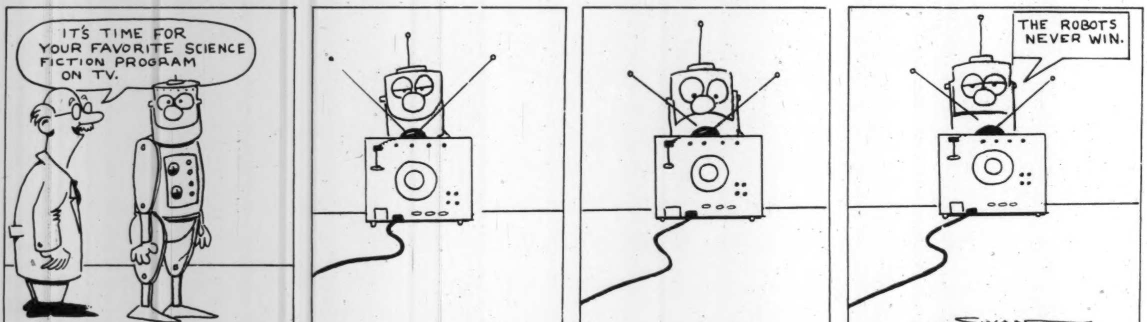
S-100 Microsystems is a new publication directed at users of S-100 microcomputer systems. It will be a forum on S-100 topics such as interfacing, CP/M, Pascal, Assembler, Fortran and Basic software.

Sol Libes, a pioneer in the field of personal computer systems will edit the publication. He is the founder and past president of the Amateur Computer Group of New Jersey.

S-100 MICROSYSTEMS will be published 6 times a year and sample copy is $2. Charter subscription is $7.50 (l yr.), $14 (2 yr.) or $21.50 (3 yr.), prepaid USA. Canada is $9/yr. and Foreign $20/yr. (add $12 for Air Mail). This charter subscription offer expires April 30th, 1980.

For more information contact: Sol Libes, 201-277-2063, S-100 MICROSYSTEMS, Box 1192, Mountainside, NJ 07092.

Conversation enriches the understanding, but solitude is the school of genius.—Edward Gibbon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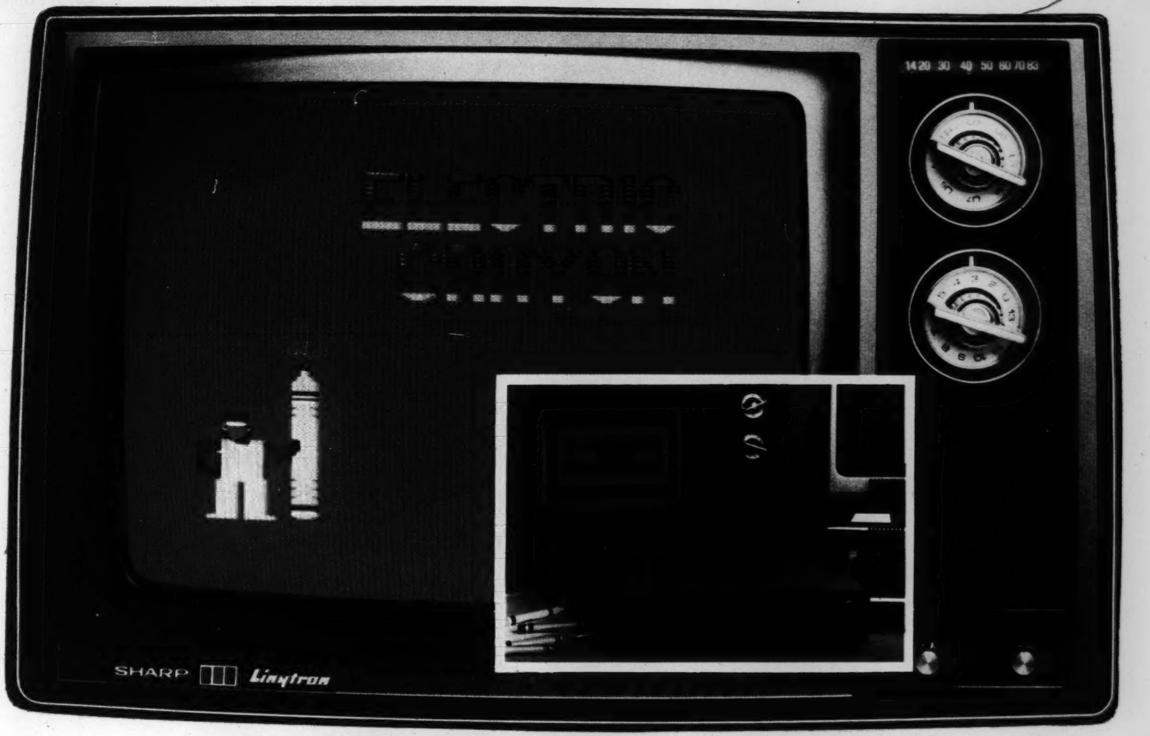

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As shipped, the Electric Crayon™ interfaces a TRS-80* computer. It may be easily adapted for interfacing to any computer or to an ordinary parallel ASCII keyboard.

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The Electric Crayon is not just a color graphics generator/controller.

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Options include:

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- A 34-conductor ribbon cable to interconnect the Electric Crayon™ to a TRS-80*: $24.95.
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SYSTEM REQUIREMENTS: the video circuitry of the Electric Crayon™ provides direct drive input to a video monitor or modified tv set. An internal up-modulator for rf antenna input may be constructed by adding inexpensive components to the existing video circuitry.

Prices and specifications subject to change without notice.

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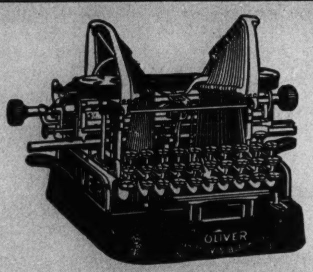
CIRCLE 177 ON READER SERVICE CARD

Input/ Output



Appause for the SWTP 6809

Dear Editor:

This is in reply to Mr. Glen Worstell's letter (Feb.'80) regarding the SWTP 6809 system and his problems with it.We have ordered and received two SWTP 6809 systems here at NYU. One is the 6809-S with 128K of memory and the other is the 6809-A with 56K of memory. Both systems simply plugged together, plugged in and worked perfectly the first time. There have been no problems with the ROM SBUG-E monitor, the double-sided, double-density disks work perfectly and the CT-82 smart terminal is a delight. We have found the ROM documentation complete and useful and the information on the dynamic address translator to be perfectly adequate. Whenever we have called SWTP, their response has been very knowledgeable, helpful, and downright friendly! This goes for the president and includes all the staff in engineering and service.

One must realize that the 6809 is a very complex and sophisticated piece of hardware with a set of instruction modes as rich as the DEC PDP-11/34. The DAT resembles the PDP-11 memory management unit, and the orthagonality of registers is similar. The sequence of stack manipulations is different between the 6800 and the 6809, which can lead to much confusion to the programmer new to the 6809.

I can only assume that Mr. Worstell as president of Parsec Systems has a rusty axe to grind, or that he and his staff lack the technical sophistication to properly implement and appreciate the SWTP 6809.

Ted Wolff
NYU Medical Center
400 E. 34th Street
New York, NY 10016

SWTP Responds

Dear Editor:

Regarding the "unhappy" letter (Feb.'80, pag.13), I would like to respond to Worstell's inaccurate and intemperate statements and innuendos about the SWTP 6809 computer.

First, his complaint concerning the "non-existence" of documentation for the ROM monitor is nonsense. Enclosed is a copy of the User's Guide for the SBUG- E which is supplied to every purchaser of our computer including the complainant. Worstell's demands upon our company related to the proprietary design information for the monitor which is not provided with the computer, but which, in no way, limits the usability of the computer for the purpose for which it is sold.

Worstell's statement concerning "several bugs" in the monitor cannot be substantiated, and though we asked him for specifics, he would not, or could not, provide details. If such a problem were to exist, though none of our many other users have reported a problem, common sense tells you we would want to know the details and correct the problem, at once, for all of our users.

Worstell's second complaint concerned what he called the memory mapping hardware. He complained that there was "no documentation on how to use it or how it works." Apparently he is overlooking pages 10 through 15 of the Computer Manual (copies enclosed) where the subject is discussed at length. Worstell apparently refuses to understand that the 64K of memory address in the computer he purchased, our Model /09 (56K), is directly addressable and, as the documentation explaines, the Dynamic Address Translator is an integral part of a system designed for multi-tasking and multiple user environments (typically these functions will be implemented on our Model S/09 (128K and larger). Worstell is not correct in saying that he has paid for circuitry which he cannot use, simply because he has opted for a system which does not utilize that part of the standard design and for which he has paid nothing extra.

Regarding the 6809 OP codes, Worstell admits they are available from the chip manufacturer, Motorola. They are included in its extensive programming manual for the 6809 for sale to the public. We cannot accept his criticism that this company does not duplicate the expense of stocking and distributing Motorola's specialized literature. We know of no computer manufacturer who distributes the chip manufacturer's manuals to the end user.

Finally we categorically reject Worstell's parting shot that he had,"...been taken since they have our money..." Early on in our contacts with Worstell, when it became apparent that he was more interested in conflict and controversy than he was in conciliation, we invited him to return his system to us for a full refund of his purchase price. This he has not done.

I would apologize for the length of this letter, Mr. Ahl, but Worstell's letter, unrebutted, cannot fail to accomplish his obvious attempt to damage this company. The spirit of his attacks are damaging to this industry as well.

Daniel E. Meyer, President
Southwest Technical Products Corp.
219 W. Rhapsody
San Antonio, TX 78216

Praise for Creative's Super Invader

Dear Editor:

I would like to heap a few words of praise on the author of Apple Super Invader. A true masterpiece of programming! No, that's not good enough! I look at all my dusty tapes and endless disk catalog listings of software, now mediocre at best, and sigh. What a waste of hard-earned money. Finally, my machine has truly come alive! For my investment, I could now have purchased the arcade machine itself, (which I've read that some individuals are actually doing). But then, what a waste that would be, as I wanted a versatile, fun and educational machine when I bought a computer. M. Hata, wherever you are, thank you!

I think your magazine is the best published for personal computing. I especially enjoyed Chuck Carpenter's Apple Cart in recent issues.

L. E. Thomas
61 John E. Smith Drive
Tewksbury, MA 01876

North Star Horizon–
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The North Star Horizon computer can be found everywhere computers are used: business, engineering, home — even the classroom. Low cost, performance, reliability and software availability are the obvious reasons for Horizon's popularity. But, when a college bookstore orders our BASIC manuals, we know we have done the job from A to Z.

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— Melvin Davidson, Western Washington University,
Bellingham, Washington

"After I gave a ½ hour demonstration of the Horizon to our students, the sign-ups for next term's class in BASIC jumped from 18 to 72."
— Harold Nay, Pleasant Hill HS, Pleasant Hill, California

"With our Horizon we brought 130 kids from knowing nothing about computers to the point of writing their own Pascal programs. I also use it to keep track of over 900 student files, including a weekly updated report card and attendance figures."
— Armando Picciotto, Kennedy HS, Richmond, California

"The Horizon is the best computer I could find for my class. It has an almost unlimited amount of software to choose from. And the dual diskette drives mean that we don't have to waste valuable classroom time loading programs, as with computers using cassette drives."
— Gary Montante, Ygnacio Valley HS, Walnut Creek, Calif.

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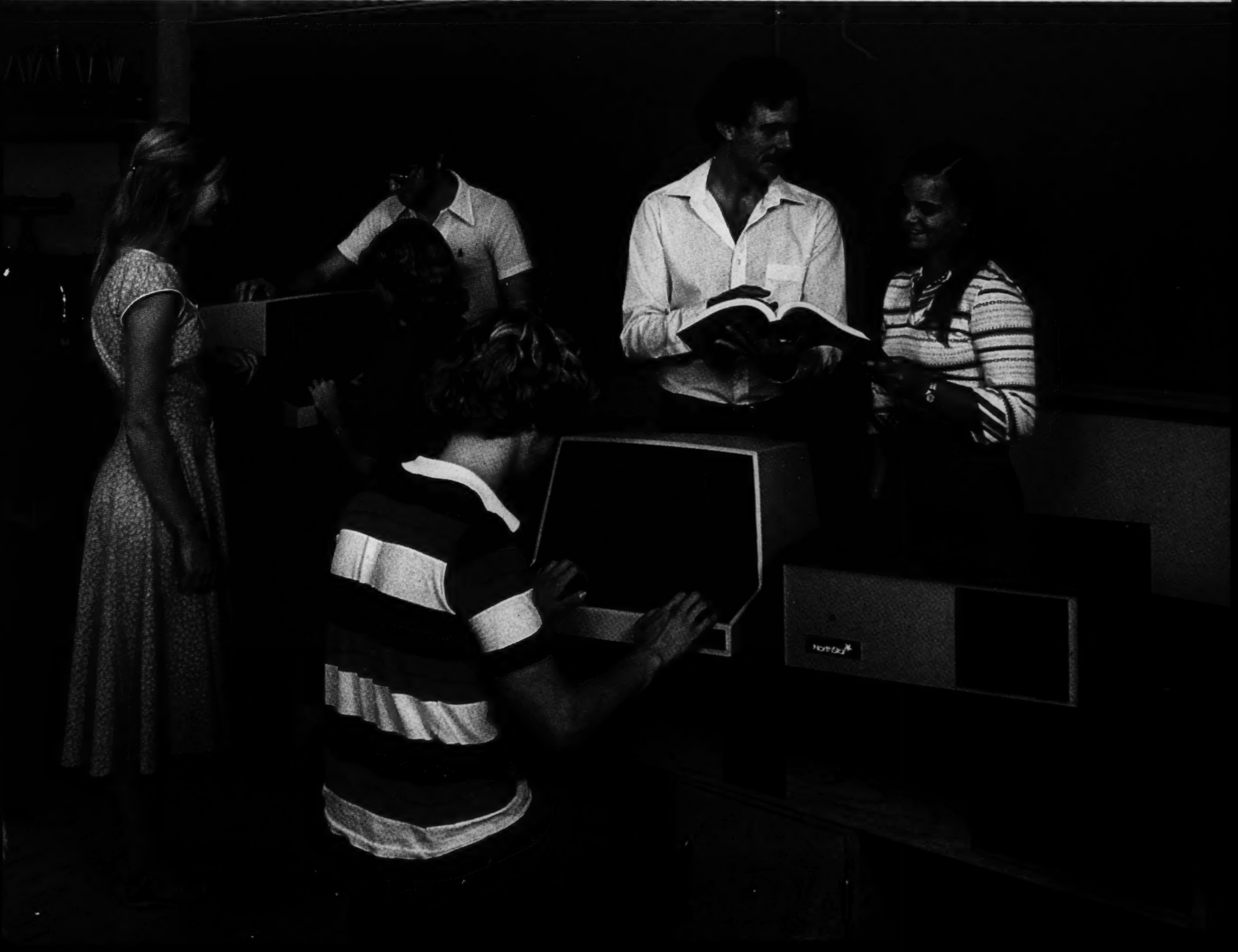

More on MicroComposer

Dear Editor:

Referring to the Micro Composer review (Feb.'80), I cannot accept credit for writing the Micro Composer software. The vast majority was written by David Williams of Micro Music, Inc. completely independent of Micro Technology or myself. I did supply the sound generation routine which is only a few hundred bytes of an otherwise huge program. The design of the music entry and editing program was done solely by Micro Music and, in my opinion, is clearly oriented towards teaching music rather than streamlined entry of music.

One thing the article failed to bring out is that the Micro Music system utilizes *software* sound synthesis with via digital-to-analog conversion. The music board supplied with the system is, in fact, an 8 bit digital-to-analog converter optimized for audio output applications. What this means is that software alone determines the type of sound produced by the system.. With proper programming (not necessarily available yet), the Micro Music board could produce more than 4 musical voices, reasonably accurate musical instrument simulations, or even speech.

Another feature is the ability to create original tone colors with the system. The user can specify the harmonic makeup of each voice or optionally use the predefined ones.

One final point concerns the availability of stereo output. Two Micro Music boards can be used to produce stereo but the number of musical voices remains at four.

Hal Chamberlin
Vice Pres. of Engineering
Micro Technology Unlimited
P.O.Box 4596
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When to Castle

Dear Editor:

Concerning the February, 1980 Input/Output Chess comments by Stephen Kimmel:

Mister Kimmel is the recipient of some rotten input from Human 1400 when concerning the legitimacy of castling through check.

According to the Official Rules of Chess (US Chess Federation, Article 6.1:)

"Castling is prevented for the time being-
(a) if the king's original square **or the square which the king must cross** or that which it is to occupy is attacked by an enemy piece...."

Robert A Fowkes
(Human 1800)
3 Reeback Drive
Ossining, NY 10562

"Turning Over" The Clock

Dear Editor:

I enjoyed your October, 1979 issue, and the article "Graphics Digital Clock" pp. 110-113. However, the program contains a serious flaw as it was printed.

The problem arises when the clock attempts to "turn over." That is, when the clock tries to go from 12:59:59 to 1:00:00, (or from 23:59:59 to 00:00:00 in 24-hour format) the computer finds a "for-next" error and execution stops.

Fortunately, there is a simple solution. Insert these lines:

```
25  On error goto 1000
1000 If Z=24 then H=0:M=0:S=0:Resume 120
1010 If Z=12 then H=1:M=0:S=0:Resume 120
```

Now, when the time comes for "turn over," TRS-80 will pause for just a split second, then resume timekeeping correctly.

Otherwise, Mr. Hinrichs is to be commended on his fine application of the TRS-80's amazing Level II high speed graphics features.

Michael Sullivan
Box 90
DeKalb, Ill.
60115

Sorcerer As a Terminal

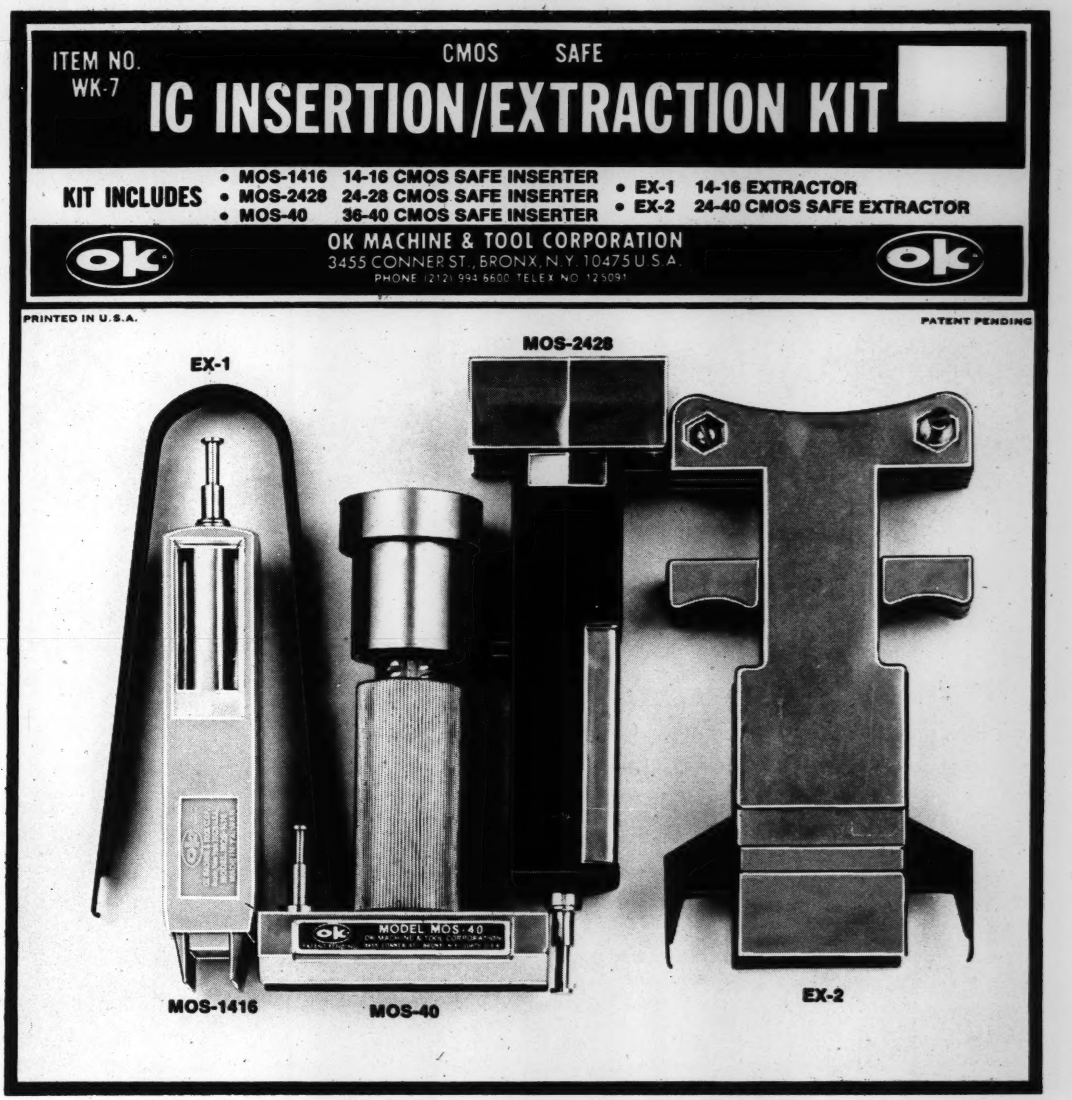
Dear Editor:

The Sorcerer's serial data cable (Exidy part number DP4005) is not enough to connect an accoustic coupler to the Sorcerer computer. It has no RS (request to send) line which is essential to the communication between a terminal and a host computer.

There is a +12 volts pin (#9) on the Sorcerer's serial interface, so I conntected it to the #4 pin (RS) pin of an acoustic coupler with wire and 1KΩ (1/4 W) resister. By this modification I succeeded in using the Sorcerer as a computer terminal.

Also, the Sorcerer dumb terminal program (supplied on cassette) has two defects. First, it doesn't select parity, the number of stop bits and the number of bits per character. Second, when the number of received characters per line from a host computer exceeds 64, the rest of the line is not printed on the CRT screen. But one can easily correct these defects by inserting some machine instructions.

Kazuo Nakamura
5-2-1-1402 Oji Kita-ku,
Tokyo, Japan 114



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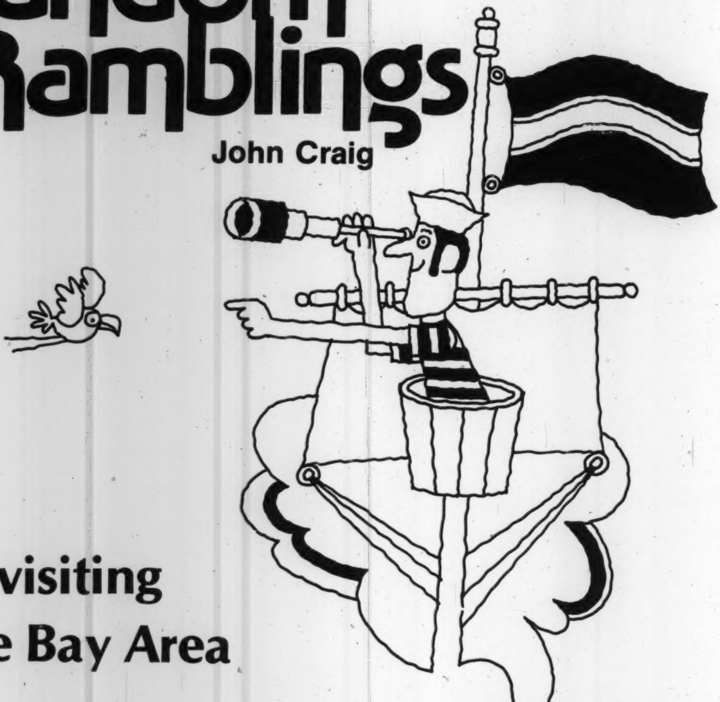
CIRCLE 173 ON READER SERVICE CARD

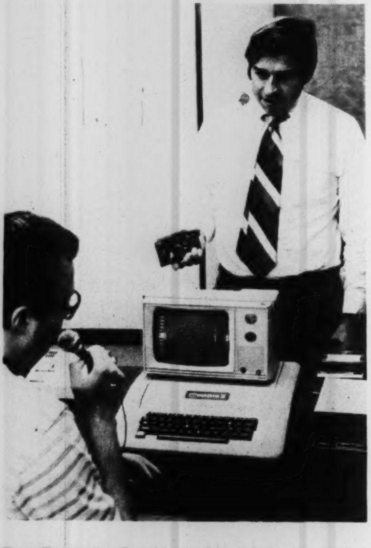
Random Ramblings

John Craig



Revisiting the Bay Area

On a recent trip to the Silicon Valley we stopped in to visit several companies that are doing some exciting things. We think you'll find them as interesting as we did.



Tom Tisch, the President of Heuristics, is shown holding the H-2000 Apple Speechlink while an associate demonstrates the system.

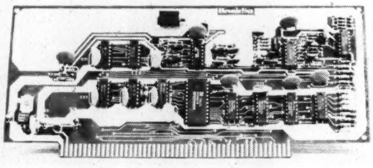
Does Your Computer Hear You?

When is the last time you sat down and talked to your computer? Undoubtedly there are times when we all have choice things to say to the little monsters, but now we can also make them listen. Heuristics, Inc., has been making a speech recognition board for S-100 systems for several years now and they've recently announced a new set of boards for the Apple II. (They also make a voice recognition unit which is sold in the retail stores of a major manufacturer of personal computers.)

Before this decade is out we're going to be seeing and hearing a great deal from this technology of speech recognition and speech output. The idea of a totally speech-controlled system is not out of the realm of possibility even with today's technology. Can you imagine an operating system which, upon powering up, waits for a voice command? The operator says, "Load Accounts Receivable." The computer then responds, by synthesized voice, with, "Can't load. Please insert program disk in Drive A and data disk in Drive B." The operator corrects the oversight by inserting the correct disks. The computer then responds with, "Thank you," and proceeds to load the program. It then asks, "Please specify function — Create Record, Update, Billing, Totals, Merge to General Ledger or List." (We have a very talkative computer.) Perhaps the most fascinating application would be in word processing where someone actually dictates text to the computer, such as a business letter or a book. I can see it now, by the year 2030 we'll have a hard time finding typists in this country!

There are times when we all have choice things to say to the little monsters.

Another area which holds great potential is speech therapy. Heuristics has a program, Voiceplot, which displays an instantaneous graph of speech patterns (3 frequency bands and amplitude). The program is available for the Apple, TRS-80 and North Star and could be very useful in training small children to overcome speech problems. The child would speak a certain word into the microphone and the graph would be displayed on the screen immediately. The instructor, or speech therapist, could then take a grease pencil and draw the graph on the CRT as it should be and ask the child to try again, this time trying to match up with the grease pencil mark. It would be fascinating to watch the speech improve as a result of that feedback. This technique could also be used to teach correct accents in foreign languages.



The latest version of the S-100 Speechlab board.

Many of Heuristic's Speechlab (S-100) and Speechlink (Apple) boards find their way into industrial applications. They offer a lightweight headset boom microphone for voice input while an operator is busy performing some chore with his or her hands. They've also developed a new standalone voice control unit, the Model 1600 Controller, which can control up to 12 devices.

The H-2000 Speechlink for the Apple has a suggested retail price of

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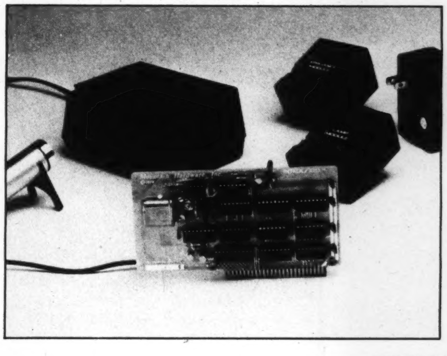

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CIRCLE 168 ON READER SERVICE CARD

Ramblings, con't...

The Corvus 10 megabyte hard disk system allowing itself to be photographed next to the relatively "puny" mini-floppy of the TRS-80.

$259. It can be used with the Model 70 controller which has four relay contact-closure outputs for controlling external devices with the Apple. The S-100 Speechlabs have a suggested retail of $399 and $599, respectively, for 64 and 255 word vocabulary models. For further information, contact your local computer store or Heuristics, Inc., 1285 Hammerwood Ave., Sunnyvale, CA 94086.

Newsflash! Solution to the Hard Disk Backup Problem

Several Winchester technology hard disk systems have been announced recently. They have undoubtedly opened up new business markets because of their relatively low cost and high capacity. However, there has been the nagging problem of how to effectively back up one of these little giants. It's possible to assign a person the task of spending several hours to back up a 10 megabyte drive with 8" floppy diskettes (and I wouldn't even consider it with the small 5" diskettes). There have also been a couple of 3M cassette drive systems which cost from $1900 to $3000 and can back up a 10 megabyte disk in a matter of minutes. Or, you could buy a second hard disk for backup and spend 3 or 4 thousand extra dollars in the process.

Corvus Systems, Inc., has come up with a unique, practical and low-cost solution to the problem. They've developed additional hardware and firmware, which sells for approximately $790 and works in conjunction with their controller so that a video tape recorder (VTR) can be interfaced to the hard disk. The entire 10 megabyte hard disk can be dumped to the VTR in *10 minutes.* So there you have a fast, and presumably reliable, backup system which consists of $790 worth of hardware and a $700 VTR for a total cost of about $1500.

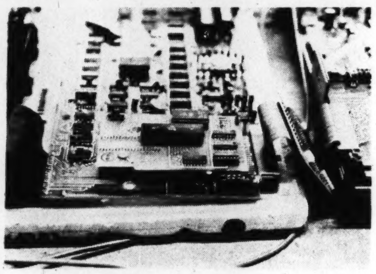
Corvus has been running ads for some time which depict their 10 megabyte IMI-7710 Winchester hard disk sitting next to an Apple. As a result, I was left with the impression their drive was for the Apple and missed the point that it was also available for the TRS-80, S-100 (CP/M) and LSI-11 systems. Therefore, we took a photo of the drive sitting next to a TRS-80 to help make that point in case you missed it too. The system sells for $5350 (with an add-on drive for $2990) and runs under the operating system of the host computer. Corvus Systems, Inc., 900 S. Winchester Blvd., San Jose, CA 95128.

More Than Just A TRS-80?

Without a doubt, there's a lot of software floating around for the Radio Shack TRS-80. However, I don't feel there is a significant amount of sophisticated business software for the TRS-80 compared to that available for CP/M systems. Structured Systems Group, Graham-Dorian and Peachtree Software are just a few of the companies that have developed some very good business packages that I wouldn't be afraid to implement in a business of my own. And, that's not intended as a disparagement toward the people who have put together business packages for the TRS-80. It's just that those programs have been designed to work within the constraints of the system. Even Radio Shack realized the shortcomings of the Model I for business applications and that's the reason they came out with the Model II with standard-sized floppies.) Now, thanks to Parasitic Engineering, serious TRS-80 based business systems can be put together with 8" drives and CP/M.

The installation of the boards is as easy as changing a tube in a TV. However, that statement can be misleading.

The Parasitic Engineering Maxi-Disks working in a "mixed & match" configuration with the TRS-80 minis . . . running TRS-DOS or CP/M.



The Shuffleboard which makes it all possible. Plugs right into the TRS-80 Z80 socket.

Howard Fullmer and Gene Nardi started Parasitic Engineering way back in the early MITS Altair days by developing a clock-fix board for the erratic Altair. They saw themselves as "parasites" jumping on the S-100 "bandwagon" (they have a sense of humor, too). They eventually went on to develop several other products including the Equinox S-100 system (which, incidentally, is the heart of the system being used to write this article). Their latest product is the Maxi-Disk which, through some creative engineering, is a standard-sized disk system running CP/M.

The problem confronting Parasitic in designing this adaption was that the TRS-80 uses lower memory for several things, such as the memory-mapped video, and CP/M also operates in lower memory. Quite simply, they designed a board, called the "Shuffleboard," which plugs into the TRS-80's Z80 socket and causes the lower 16K to be released for use as RAM. Another "piggy-back" board contains a new disk controller chip and plugs into the disk controller socket in the expansion interface. This allows for running mini-drives, with TRS-DOS, along with standard (Maxi) drives and CP/M, or just one or the other. In both cases, the installation of the boards is as easy as changing a tube in a TV. However, that statement can be misleading. A friend of mine "simply" plugged the boards in and has had some difficulty in getting the system up. Parasitic has been extremely helpful but there is only so much that can be done over the phone. At last word, my friend was getting together with fellow TRS-80 owners to do some swapping around to determine if the problem is in his expansion interface, the boards or the TRS-80 itself. It is hoped the problem will turn out to be something simple — it usually is.

The Maxi-Disk drive sells for $995, which includes a Siemens FD 100-8 drive, power supply, cabinet and interface board. Additional drives are $845 and the Shuffleboard with a copy of CP/M on 8" diskette (and complete documentation) sells for $249. Parasitic Engineering, 1201 10th St., Berkeley, CA 94710. □

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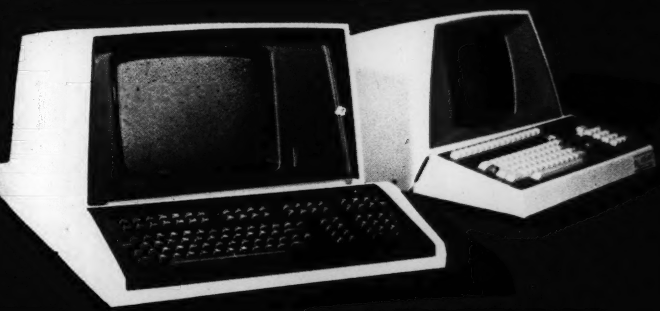

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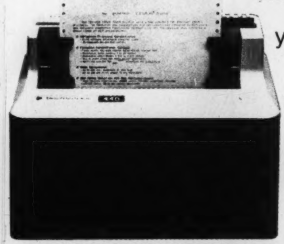

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Effective Writing

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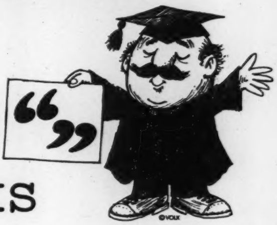
Quotations and ‘Quotation’ Marks



Quotations and ‘Quotation Marks’

In writing directions for the use of a program suppose you want to say:

For help, type “HELP”.

Standard grammatical convention would place the period inside the quotation marks. However, the command you wish to be typed into the computer is HELP without a period and indeed the period could alter the command. What to do? The obvious solution is to depart from standard convention and type it as in the example above. Another solution is to recast the sentence, for example:

Type “HELP” if you need help.

Another possibility, if the material is going to be typeset, is to show input and output to the computer in a different typeface:

For help, type **HELP.**

Sometimes that approach isn't all that helpful. For instance, can you easily tell if the period is bold (and part of the command) or not?

Furthermore, for showing computer input and output together in a sample program run, it is frequently desirable to differentiate input from output. The easiest way to do this is with an underline.

```
HI!  I'M ELIZA.  WHAT'S YOUR PROBLEM?
? YOU
WE WERE DISCUSSING YOU-- NOT ME.
? BUT YOU ATR THE PROBLEM
OH, I ATR THE PROBLEM
? SO I MISSPELLED A WORD
SAY, DO YOU HAVE ANY PSYCHOLOGICAL PROBLEMS?
? NO DO YOU
YOU'RE NOT REALLY TALKING ABOUT ME, ARE YOU?
? ONLY BEHIND YOUR BACK
WHY ARE YOU CONCERNED ABOUT MY BACK
? BECAUSE I'M AFRAID TO CON FRONT YOU
DID YOU COME TO ME BECAUSE YOU ARE AFRAID TO
  CON FRONT I
? YOU SPEAK WIERD ENGLISH
WE WERE DISCUSSING YOU-- NOT ME.
? AM I GETTING THE BEST OF YOU
OH, I
? WHAT IS THAT SUPPOSED TO MEAN
WHY DO YOU ASK?
? WHY NOT
```

In this example perhaps the input was clear enough without an underline because it always followed a question mark, however if GET statements had been used or the input prompt had not been printed, then an underline or other differentiation would have been vital.

Quotations

Indirect quotations and paraphrases are treated no differently from one's own thoughts and do not require quotations marks. Of course, the other source should be acknowledged.

Direct quotations, on the other hand, call for special treatment. A quotation of average length (fewer than 50 words) is generally worked into the regular text. It is included in a line begun or ended by one's own words and marked by quotation double marks. If the excerpt is a sentence by itself, the first word is capitalized and separated from other text by a comma or colon.

If the excerpt completes a sentence, the capital and punctuation are omitted. To omit a part of the quotation, suspension points — also called ellipsis points — mark the omission. These are three consecutive spaced periods and can mark the omission of one word or several sentences. If the omission is at the end of a sentence, four spaced points are used. For example:

> As noted in the Hart article, the random number generator “starts a new sequence . . . and returns the next random number in the sequence with a positive argument.”

Quotations more than 50 words long are generally set apart from the regular text. The excerpt is preceded and followed by a blank line and quotation marks are not used. As an example of this, *The New York Times Manual of Style and Usage* states:

> The period and comma should be placed inside quotation marks . . . The colon and the semicolon are placed outside: *He defined “work-week”: the average number of hours worked weekly by the men in his factory.* Question marks and exclamation marks may come before or after the quotation marks, depending on the meaning: *The crowd shouted, “Long live the king!” Just imagine, he was afraid of “elephants without trunks”! “Who are these ‘economic royalists’?” he asked. Have you read “Lord Jim”?*
>
> In continuous quoted matter that is more than one paragraph long, place a quotation mark at the beginning of each of the paragraphs and at the end of the last paragraph only.

Other Uses of Quotation Marks

Quotation marks are also used to denote words used in a special way and slang when it is introduced into formal writing. Two examples follow. One of the PC boards was “decrudded” with ammonia and rubber cement solvent. “Quotes” is slang for quotation marks.

Quotation marks are used to enclose titles of short poems, short stories, articles, lectures, chapters of books (but not book titles), songs, and radio and TV programs. “Don't Bother Me, I'm Learning” was an excellent special recently aired on PBS.

Quotation marks may be used to denote letters, numbers, words, and phrases used apart from their meaning. For example, loop the “9” more distinctly, cross the “t,” omit “very.”

Lastly, quotation marks have begun to be used to show disdain. This use is not discussed in any style guide as far as I know. Henry L. Trewhitt of The Baltimore Sun calls these “cop-out quotation marks” — when a writer uses a bit of jargon or a colloquialism and encloses it in quotes to show he really knows better. A related use is to put a “snear” connotation on a word. Thus, the terrorists at the U.S. Embassy in Iran are referred to as “students.” World Book Dictionary editor Sol Steinmetz thinks that “disbelieving quotation marks” first became popular during the Nazi era, and then were given a boost in the Vietnam years, especially around the word “advisors.”

Last but not least, avoid cliches like the plague; seek viable alternatives and “avoid overuse of ‘quotation “marks.”’” □

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EQUIPMENT PROFILE

Heathkit WH-89 (All-in-One) Computer

Randy Heuer

Heathkit has long been known as a manufacturer of quality electronic kits. Several years ago, Heath brought out their first two computer kits. Frankly, I found these initial machines somewhat disappointing. Perhaps being familiar with the innovative features introduced by Heath in many of their other electronic kits I expected too much from their first computers.

I'm happy to report that Heath has once again introduced an innovative electronic component and this time it is a computer. The WH-89 is a Z-80 based microcomputer in the same class as TRS-80, Apple and PET with the potential to give these systems a run for the money.

Hardware

The WH-89 is nicknamed the "All-in-One," since the keyboard, video display and disk drive are all contained in the same cabinet. The unit is nicely styled and, after getting used to multiple wires and cables hanging out all over the place on other computers, the single wire to the wall socket was a refreshing change.

> **The unit is probably the most professional looking of any of the popular microcomputers on the market today.**

Actually, it would be incorrect to lead people to believe that all one has to do is plug the unit in and start programming. The WH-89 is the assembled form of the computer, but the accessories (additional memory, serial I/O board and cassette interface) come in separate boxes and require various degrees of assembly. Additional memory is simply plugged into the logic board and a few jumpers are changed. On the other hand, the cassette interface requires soldering and assembly of cables. Although no major construction is necessary to install these accessories, some people may feel put-out to have to do this work.

The unit itself is probably the most professional looking unit of any of the popular microcomputers on the market today. Housed in a heavy plastic shell, the unit looks more like a mainframe console terminal than a home computer. The keyboard is of professional quality, featuring a full, standard typewriter keyboard and a numeric keypad. Each time a key is pressed, the speaker inside the cabinet clicks providing a confirmation of each entry.

The video monitor is one of the finest available on any microcomputer today. The screen is easy on the eyes and the characters are very sharp. It measures 12" diagonally and displays 25 rows of 80 characters. Each character is formed by a 5 x 7 dot matrix except for some graphic characters and lower case characters which employ descenders and use a 5 x 9 matrix.

The disk drive is a Wangco 82, 5¼" drive. It is mounted in the cabinet adjacent to the monitor. Each diskette holds 102K bytes of information on 40 tracks.

What makes the WH-89 different from most other microcomputers is that instead of having a single microprocessor, the WH-89 has two. One Z-80 functions as the main processor would in any computer. The other Z-80 controls the terminal functions, thus making it a "smart terminal." As a result, the CPU is not burdened with the task of handling screen functions. The Z-80 in the terminal handles cursor addressing, character insert and delete, graphics and video inverse. Among many other special purpose functions are two unique screen functions, cursor memory and a 25th line.

Cursor memory allows the terminal to "remember" the position of the cursor from a previous time. This function is implemented by moving the cursor to the desired location and then entering an escape character via the keyboard or the program. Then at a later time, after the cursor has been moved elsewhere any number of times, another escape character can be entered to restore the cursor to the memorized location.

The 25th line is another interesting and unique feature. Normally only 24 lines of text are presented on the screen. The bottom (25th) line is not used. This bottom line can be activated and printed on. However, unlike the other 24 lines, this line does not scroll but remains at the bottom of the screen. Thus special instructions, help statements, etc. can be written on this

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Heathkit, cont'd...

line and will remain at the same position on the screen regardless of what other screen formatting is done. The 25th line can be erased by a special escape character.

Hardware is only one part of a computer system. The other important component is the software. Since the combination of these two parts determines the quality of the system as a whole, let's take a good look at the software presently available for the WH-89.

Software

Another one of the differences between the WH-89 and other popular microcomputers is the amount and usage of Read Only Memory (ROM). In the Apple, PET and TRS-80, as much as 12K of the memory is ROM and contains the higher level language, Basic. Not so in the WH-89. Only 6K of memory is ROM and this is used for the bootstrap program, system monitor and other special functions. Thus all of the higher level features must be provided by the software as opposed to the firmware in ROM.

Hardware is only one part of a computer system. The other important component is the software.

This arrangement has advantages and disadvantages. The major advantage is that the user is no longer confined to doing most of his programming in the language provided, but may use any language which can be loaded into the computer RAM and supported by the system. The major disadvantages are that the operating system and higher level languages (Basic) take up a significant amount of RAM and that you are very dependent on the quality of this software. Since most people don't have the ability to write their own systems software, they have to rely on software provided by the manufacturer or other sources.

Heath provides system software for the "All-in-One" in two forms. One is for the simpler, cassette-based system. For $20 you can receive a package containing Benton Harbor Basic, Heath Assembly language, text editor and console debugger. This certainly seems adequate for getting started on the "All-in-One."

Most users of the "All-in-One" will probably prefer to use the disk-based systems software. The "All-in-One" uses the Heath operating system called HDOS. Developed for the Heath H-8 computer, this software has been adapted for use in the WH-89, HDOS bears a greater resemblance to the CP/M operating system than the operating systems of TRS-80 or Apple.

The Heath Data Systems WH89 is a totally integrated microcomputer system contained in a compact, desk-top terminal that supplies all of the computing power needed for most small business or professional tasks. It is shown here with cover removed.

With the system disk, which costs $100, you receive Benton Harbor Basic, an assembler routine, text editor, console debugger, a set of utility programs, and manual. HDOS is fairly complete and easy to use. The first chapter of the manual leads the user through the process of initializing and SYSGENing new diskettes, using the one drive copy utility, and writing and saving programs. It's intended for the first time user and should help the novice understand how to get started with the WH-89.

Users will probably want a higher level language than assembly language for most programming tasks. While Benton Harbor Basic may be adequate in some cases, most people will prefer the more popular and powerful Microsoft Basic (MBasic). This language is available on diskette for an additional $100. This is the same diskette sold for the H-8 system and therein lies a deficiency with this release. There's a lack of easy and direct access to the smart terminal functions and graphics from this language. These special features can be accessed only in a roundabout way by use of ASCII codes and the CHR$ function. For example, to clear the screen one must write a statement such as PRINT CHR$(27);CHR$(69). This is not as easy as the CLS or PRINT AT features of the TRS-80.

In addition, there apparently exists a memory allocation problem between HDOS and MBasic such that memory protection for machine language subroutines cannot be guaranteed. As a result, Heath recommends that the USR function not be used with this release of MBasic. Heath has promised that all registered purchasers of this version of MBasic will receive the update that corrects this problem in early 1980. So perhaps by the time this article runs this problem will have been solved.

It would be in Heath's best interest to "tailor" their Basic to the "All-in-One." Most users of the WH-89 will not be able to make maximum usage of graphics and the terminal functions with the present form of MBasic. If Heath really wants to compete with the machines popular with the home and general user market (TRS-80, Apple, etc.), they'd be very wise to update MBasic to "fit" the WH-89. Users with all levels of programming skills would appreciate an easy method for interacting with the special features of the machine as those features are generally superior to other small computers.

What Does It Cost?

Well, it depends on what you want to buy. Basically there are three ways to purchase the "All-in-One." One is the kit version without the floppy disk system (H-88). A 16K machine with a cassette interface sells for $1195. Of course you'll need to invest an additional $20 for the system software and probably will want an additional 16K of memory for $150. Total $1365.

It would be in Heath's best interest to "tailor" their Basic to the "All-in-One."

If you want a disk-based system and are willing to do a bit of assembly, a 16K kit with a Wangco disk drive costs $1595. This kit (H-89) includes the cassette interface. In addition, you'll need the disk-based system software ($100) and at least 16K additional memory ($150). If you intend to write large programs using the optional Microsoft Basic ($100), you'll need another 16K expansion kit ($150) as in a 32K machine only 6K of memory remains after loading Basic and HDOS. Total $1845 to $2095.

Heathkit, cont'd...

Finally, the fully-assembled version of the disk-based system (WH-89) costs $2295. This version is an assembled H-89 minus the cassette interface. The additional costs for software and memory expansion for the WH-89 are the same as the H-89. Total $2545 to $2795.

The only other accessory available for the "All-in-One" is a two port serial I/O board for $85. An H-88 without a disk drive can later be upgraded to a disk-based system with the purchase of a disk drive for $450 and the appropriate software.

The best buy of this group is probably the H-89. This system entails a fair amount of assembly (although the CPU is completely wired and tested), but if you can take the time and care to assemble a kit, the savings of $700 (plus a cassette interface) certainly seem justified. If I were purchasing the system, I would add 32K more of memory ($300), the serial I/O board ($85), the HDOS systems software ($100) and Microsoft Basic ($100). Thus the total price of the system is $2190. This may seem like a lot of money, but it compares favorably to a TRS-80 or Apple with similar features.

Is The "All-In-One" For You?

As with any computer system, the answer depends upon what you want in a computer. If you are looking for a machine with a large amount of software presently available and geared mainly toward personal use, then perhaps you'd do better to look elsewhere. However, if you are interested in acquiring a computer with a great potential for sophisticated applications, it would be worth your while to take a good look at the "All-in-One."

If you are interested in acquiring a computer with a great potential for sophisticated applications, it would be worth your while to take a good look at the "All-in-One."

Based on a comparison with other systems, the "All-in-One" is one of the finest pieces of complete computer hardware in the less than $3000 class available today. This system combines the ease of use of the home computer with some of the features found in the more complex, S-100 based systems. However, there is very little provision for expansion outside of the peripherals available now, so users wishing to add accessories such as music boards and color graphics should probably consider another system. Basically the "All-in-One" is intended to be a single disk drive, 48K machine with provisions for a printer and a cassette unit. A large percentage of users and potential users of a small computer system will find this amount of hardware adequate for their needs.

The "All-in'One" has an excellent start toward becoming a major force in the small computer market. Its sophisticated hardware gives it an advantage over most other small computers. The key for making it a complete winner is the development of equally sophisticated software. The HDOS systems software is good. The Microsoft Basic available for the "All-in-One" is adequate but needs to be specifically tailored to the "All-in-One" before most users will be able to take full advantage of the hardware. If Heath or some other software source develops another high level language (such as Pascal) and perhaps a screen-oriented word processing system (a la Electric Pencil) for the "All-in-One," this computer can have a major impact on the small computer market. □

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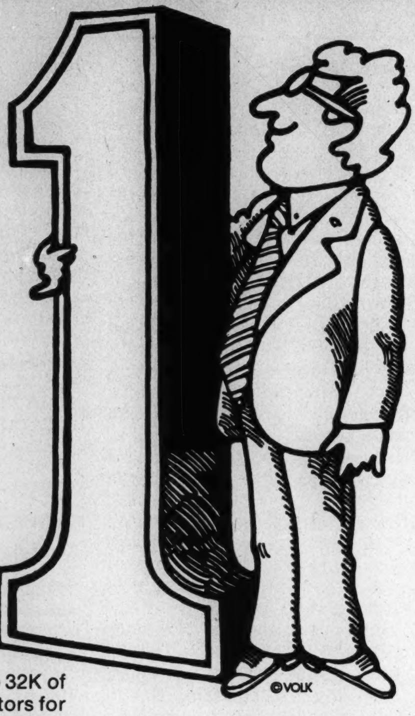
CIRCLE 131 ON READER SERVICE CARD

Atari & PET Compared

Atari In Perspective

Len Lindsay



Since I own and use both an old and new style PET, and have just acquired an Atari 800, a question I often hear is "Which computer is the best?" A good reply is "Best for what?" Note that this article is not titled Atari vs. PET, for this is not a contest, but a comparison. It is up to you to pick out the qualities you think are important for your future uses. I used a 32K PET 2001 new ROM with large graphic keyboard and a 24K Atari 800 for this comparison.

Conflicting information here and there prompted this comparison. I hope others will compare other computers, for it will help put a perspective on home computers. (How about Apple and Atari compared?) I will describe some significant aspects of each computer, and report results of similar test programs run on each. At times it may seem that I include a bit more about the Atari or leave out some PET qualities. This is because I wish to focus on Atari using the PET as a comparison (there is a lot already printed about the PET, while the Atari is a newcomer and not familiar to many). Also, I am sure that many differences and similarities are missed due to lack of space to say it all. Your comments are welcome.

The PET is one unit, designed as an all-in-one package theme. The original PET was complete in one unit, while the newer style does require the cassette to plug into the back of the main unit. The Atari is component oriented, with the computer and keyboard as one central unit. It plugs into an ordinary wall socket (there is a small power supply unit half way from the computer to its plug). The cassette player plugs into the wall socket and into the computer. The central unit must then be connected to a TV or video monitor (an RFM adapter is supplied that connects to the antenna terminals of your TV). Thus, the Atari has a few more cables and wires to worry about.

The PET can address up to 32K of RAM. There are built in connectors for the IEEE bus, a parallel port, cassette #2 and memory expansion. Commodore does not supply memory expansion boards but they are available from independent companies.

The Atari can address up to 48K RAM. There are built-in connectors for joysticks and game paddles, video monitor out, power in, peripheral expansion, ROM cartridges and RAM modules. 8K and 16K memory expansion modules are available from Atari and there are 3 sockets available for these memory modules. A 10K ROM pak is plugged in front of these memory modules. In front of these are two smaller sockets for other ROM cartridges such as the Basic interpreter, Educational System cartridge, and other software in ROM cartridges.

This is not a contest, it is up to you to pick out the qualities you think are important for your future uses.

A second tape unit can be added to the PET using the second cassette plug. The cassettes are digital and are preset for optimal performance. IEEE peripherals can be added via the IEEE port, including disk and printer. The parallel port can support joysticks, lightpens, printers, speakers, etc., but these must be added by the user. The memory expansion port can also be used to connect to a disk system.

Peripherals, including cassette, printer and disk, plug into Atari's peripheral expansion plug in a daisy chain fashion. A video monitor and standard TV can be used simultaneously since there are two separate connections (ideal for a classroom — you can face the class and see your monitor, and have a large TV for the class to see at the same time). The cassette can be used for both digital and audio recording with the volume preset for best results (the audio output comes through your TV speaker and its volume can be adjusted with the TV volume controls). You can load a program as well as use verbal instructions on the tape. The cassette has a 3 digit counter.

The PET has a 74 key keyboard including a numeric keypad. Special keys include REVERSE ON/OFF, SHIFT LOCK, RUN/STOP, HOME CURSOR, CLEAR SCREEN, CURSOR UP, DOWN, LEFT & RIGHT, INSERT and DELETE. The PET can operate in either graphics or lower case mode. Graphics are shifted letters and numbers. When in lower case mode the alphabetic keys become upper and lower with their corresponding graphics unavailable.

The Atari has a 61 key keyboard. Special keys include REVERSE ON/OFF, ESCAPE, BREAK, CONTROL, TAB, TAB SET/CLEAR, CAPS LOCK, CURSOR UP, DOWN, RIGHT & LEFT, CLEAR SCREEN, INSERT CHARACTER/LINE, DELETE CHAR-

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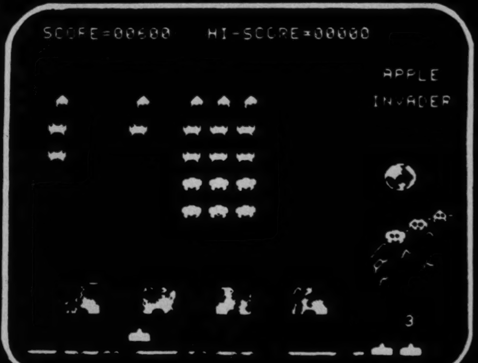

```
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                            3
```

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Atari, cont'd...

ACTER/LINE and BACKSPACE. A similar set of graphics is available from the keyboard as with the PET. However, other graphics are available as well by plotting. Hold a key down for a second and it begins a fast repeat action, excellent for special key functions such as cursor movements. And like a typewriter, the unit will beep when you are almost at the end of the line.

Both the Atari and PET allow special key functions to be written into your program (i.e., your program can move a cursor around, etc.). Both have excellent screen editing. The PET video output is only black and white, while the Atari is in full color. It has 3 different text modes plus 6 graphic modes, including high resolution with many Basic commands for color control and plotting and drawing lines. In text mode 0, text can be displayed normally with 24 lines of 40 characters each. Text mode 1 prints double width characters (24 lines of 20 characters). In text mode 2, the letters are double height as well as double width (12 lines of 20 characters). The text can be in varying colors. A four line text window is also available while in text modes 1 & 2 and all graphic modes. The several graphic modes allow for varying resolution. The higher the resolution, the more memory is used by the operating system to keep track of the screen display. Highest resolution is 320 x 192 (and this mode requires your Atari to have 16K RAM). Atari also has a small beeper built in, and access to sound, 4 voices, almost 5 full octaves, plus tone control (including special effect noises such as a buzzing sound). Joystick and game paddle commands are built into Atari Basic as well as random access disk commands.

There is a lot already printed about the PET, while the Atari is a newcomer and not familiar to many.

PET Basic is by Microsoft, often referred to as the industry standard. Atari Basic is not by Microsoft, but is Shepardson Basic, supposedly by those who brought you Cromemco Basic. Both are similar in many aspects, and I will leave benchmark timings to someone else. Both use the question mark "?" as an abbreviation for PRINT. Both allow you to OPEN and CLOSE files to various devices.

Having a Basic interpreter done by Microsoft is a real convenience since most program listings in magazines or books are most compatible with it.

Variable Names

Now on to my comparative test programs and their results. I will begin by testing what names can be used for variables. Here is the first program I tried on both computers:

```
10 AZAZAZ=12

20 PRINT AZ

30 PRINT AZAZAZ


PET RESULTS  : 12

               12


ATARI RESULTS:0

              12
```

The PET video output is only black and white, while the Atari is in full color.

Both let one use a six character variable name. The difference is that only the first two characters are significant to the PET, while every character is significant to the Atari.

Next I tested numeric characters as part of the variable name with this program:

```
10 A1=10

20 A12=20

30 PRINT A1,A12


PET RESULTS   :'20'''''''''20
```
(the ' denotes a space)

```
ATARI RESULTS:10'''''''''20
```
(the ' denotes a space)

Both accepted numeric characters, and note that PET once again only used the first two as significant. Also note that they both have set tab points used when printing items to the screen separated with a comma. Then I tested the & symbol within the variable name:

```
10 A&=12
```

Neither computer accepted this. The PET accepted the line when entered, but when a RUN was attempted gave this message:

```
?SYNTAX ERROR IN 10
```

The Atari rejected it immediately after I hit RETURN with this message:

```
10 ERROR-    A&=12
```
(the & was in reverse field)

This points out a significant difference between PET Basic and Atari Basic. PET allows you to enter lines containing anything you wish. It only rejects a line as incorrect when it attempts to execute it. The Atari checks each line as it is entered and will immediately tell you if it finds an error.

How about lower case characters in the variable name? I tried this:

```
10 a=12
```

Neither accepted this. The Atari rejected it immediately with an error message. The PET gave its error message when it was RUN. However, the PET did accept AAa=12 with no apparent problem, indicating that it must have ignored the characters after the first two significant ones.

Now to test another area of conflict, can Basic keywords be used within variable names? The PET always gave a SYNTAX ERROR for the following programs, but the Atari varied in its response:

```
10 SCORE=20

20 PRINT SCORE

30 POINTS=12


ATARI RESULTS:20

               30 ERROR-  POINTS=12
```

It accepted SCORE as a variable and printed its value of 20 fine. But when I added line 30 to the program it rejected it with the error. Both of the next one line programs resulted in an error message:

```
1 END=12
```

and

```
1 LIST=12
```

The following program illustrates the danger of using Basic keywords, even if Atari Basic lets you:

```
10 B=0

20 NOTB=2

30 PRINT NOTB
```

The Atari printed 1 as the answer. Thus you see that the Atari accepts Basic keywords **sometimes!** And then again, other times it just might not. My advice would be — **never use Basic keywords as part of a variable name** (it's safer that way).

From these tests we can say both allow more than one character to be used, but the first character must be upper case alphabetic and the rest must be either numeric or upper case alphabetic. Neither safely allows the use of Basic keywords as part of a variable name. The Atari accepts every character in your variable name as significant, while the PET only uses the first two characters as significant (and ignores the following ones).

Subscripted Variables

I then compared the use of subscripted variables. Both accepted

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A(1)=12. The Atari accepted A(12)=24 while the PET gave a BAD SUBSCRIPT ERROR (any subscript over 10 must be DIMed first). The Atari accepted A(12,12)=234 (PET once again gave the error message). The PET accepted A(1,1,1)=123 while the Atari gave the message: ERROR A(1,1,1)=123 (with the second comma in reverse field). However, the PET did not accept A(1,1,1,1)=123 and gave an OUT OF MEMORY error (I did a PRINT FRE(0) and had 31706 free bytes).

Thus, I would conclude that the PET will allow up to a triple subscript. All must be DIMed if any of the subscripts will be over 10. The Atari will allow up to a double subscript, and the DIM question needs further investigation.

Variables Cleared With A Run?

While we are looking at variables, I tried this program on both computers:

```
10 DIM A(3,3), B(4)
15 DIM D$(4) : REM (this line needed for
                    the ATARI only)
20 PRINT A(3,3), B(4), C, D$
30 A(3,3)=5 : B(4)=5 : C=6 : D$="TEST"
```

The first time the program was run, both computers gave the same results:

```
        0     0     0
```

However, a second RUN, done immediately after the first, gave these results with the Atari:

```
        5     6     0
```

Neither safely allows the use of Basic keywords as part of a variable name.

PET still gave all zeros. This means that when a program is RUN all variables are cleared in the PET. Arrays are not cleared in the Atari, however, and this must be kept in mind.

Get One Character

Although both Atari and PET have the GET command, there is a distinct difference in its use. For example:

```
10 GET A
20 PRINT A
```

Atari gives an error, while the PET prints 0 (it looks at the keyboard for a blink of an eye, sees nothing, and thus goes to line 20 and prints a 0, for it hasn't assigned a value yet). The following program shows correct use of GET for the Atari:

```
10 OPEN#2,4,0,"K:"
20 GET#2,A
30 PRINT A
```

When run on the Atari, it waits until you hit a key, then prints the coded value of the key hit. For example, I hit T and it printed 84. I hit U and it printed 85. This is very different from the PET which looks only once at the keyboard and, if a key was hit, it gets the character itself rather than the coded value of it.

Wait Till A Key Is Hit Program: Both computers can be programmed to wait till a key is hit and then continue. A possible PET code is:

```
10 GET A$ : IF A$="" THEN 10
```

Possible Atari code is:

```
10 IF PEEK(764)=255 THEN 10
```

Keyboard Buffer: This brings up the keyboard buffer. As a test I ran this program:

```
10 FOR X=1 TO 9999 : NEXT X
```

Immediately after it was run I hit some keys. As soon as the loop is done the computer prints what is in the keyboard buffer. The PET could remember up to the last 9 keys I hit. However, if I hit a 10th key it forgot all of them, including the 10th key, and began over again as if no keys were hit. The Atari remembered only the last one.

Numeric Representation

PET and Atari use different methods of representing and printing numbers on the screen. (Did you notice the difference in output for the previous test on numeric characters within variable names?) I ran this program:

```
10 A=1
20 B=2
30 C=-3
40 D=-4
50 PRINT A;B;C;D
```

The semicolons mean that the cursor remains where it is after printing rather than executing a carriage return. Thus the values of A, B, C and D will be printed one after another.

```
PET RESULTS   :′1′′2′-3′-4
                   (the ′ indicates a space)
ATARI RESULTS:12-3-4
```

The Atari appears to represent the number as we would: 1, is 1, if a negative sign is needed, it is included. The PET, however, appears to have a different strategy. It seems to represent a number thus: The first character is the sign (a - is printed if negative, or else a space is printed). Next, the number is printed. Finally, a cursor right is printed and the PET is done.

This would explain the difference in the printed output. Change the semicolons in line 50 to commas and these results are seen:

```
PET RESULTS  : 1      2     -3     -4

ATARI RESULTS:1       2     -3     -4
```

Both acknowledge the comma to mean skip to the next default tab position.

Next I tested how very large numbers would be printed with this program:

```
10 A=1234567891
20 B=1234567899
30 C=123456789123456789
40 PRINT A
50 PRINT B
60 PRINT C
```

```
PET RESULTS   : 1.23456789E+09
                1.2345679E+09
                1.23456789E+17

ATARI RESULTS:1234567890
              1234567890
              1.23456789E+17
```

Both computers use scientific notation and have 9 digit accuracy, with the PET rounding the last significant digit, and the Atari truncating it.

Looping — A Quick Look

I then tested how many nested FOR . . . NEXT loops each machine could handle:

```
1 FOR A=1 TO 99
2 FOR B=1 TO 99
3 FOR C=1 TO 99
4 FOR D=1 TO 99
5 FOR E=1 TO 99
6 FOR F=1 TO 99
7 FOR G=1 TO 99
8 FOR H=1 TO 99
9 FOR I=1 TO 99
10 FOR J=1 TO 99
11 FOR K=1 TO 99
12 FOR L=1 TO 99
13 FOR M=1 TO 99
14 FOR N=1 TO 99
15 FOR O=1 TO 99
16 FOR P=1 TO 99
17 FOR Q=1 TO 99
18 FOR R=1 TO 99
19 FOR S=1 TO 99
20 PRINT S,T
21
```

program would continue here with NEXTs as needed, but are not necessary for this test.

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Atari, cont'd...

```
PET RESULTS:?OUT OF MEMORY ERROR IN 11

ATARI RESULTS:1        0
```

The PET appears to only allow 10 levels of nested loops, while the Atari may be unlimited. Other tests showed that the PET will allow a simple NEXT while the Atari will not, requiring NEXT X (the loop variable must be specified). PET also allows NEXT X,Y (a multiple NEXT) while the Atari will not.

Variable GOTO, GOSUB and LIST

The Atari allows the use of variables for target lines in a GOTO, GOSUB, or LIST statement as shown with this program:

```
10 HERE=200

20 GOTO HERE

30 PRINT "NOT HERE"

200 PRINT "HERE AT LINE 200"

210 HERE=400   GOTO 20

400 PRINT "HERE AT LINE 400"


PET RESULTS   :?UNDEF'D STATEMENT
                           ERROR IN 20

ATARI RESULTS:HERE AT LINE 200

              HERE AT LINE 400
```

Slight modifications will show that GOSUB responds likewise. Then I tried:

```
LIST HERE
```

The Atari listed line 400, since after running the program HERE contains 400. Not bad at all. This capability should prove to be a lot of fun.

The Atari clears out any program presently in memory when it encounters the command CLOAD, while the PET does not.

Video Screen Line Lengths

Line lengths are similar on both computers. The PET has 25 lines of 40 characters per line and allows two lines to be used consecutively for an 80 character logical line.

The Atari has 24 lines with a default of 38 characters per line and allows three lines as a logical line. However, it also allows the user to change the line length. With two POKE commands you can change your line length to 40, or 36, or 38, for example. Thus, the logical line would be 120, 108 and 99, respectively, with 114 as default logical line length.

The PET requires the cursor to be on one of the characters in the logical line when RETURN is hit to take effect. The Atari allowed me to hit return with the cursor on the fourth line accepting the previous three (one logical line), but only if the cursor was on the fourth line due to typing past the end of the third line.

Atari allows the line lengths to vary within a program. For example, I tried this program:

```
10 PRINT "ONE"

20 POKE 82,5:REM SET LEFT MARGIN TO 5

30 PRINT "TWO"

40 PRINT "THREE"
```

The results when RUN were:

```
          ONE

          TWO

               THREE



               READY

               ▒
```

Note that the change in left margin did not occur when the POKE was issued, but rather after the next carriage return was issued following printing TWO.

Cursor: In case you were wondering, a cursor is the marker that indicates your present location on the screen. The PET cursor is a blinking white box. If a character is beneath the cursor it alternates reverse field on and off. The Atari cursor also is a white box, although it does not blink. Any character beneath it is reverse field.

Loading and Saving Programs

Load: The PET loads a program from tape in this manner: You type in LOAD"PROGRAM NAME" (or simply LOAD) and hit RETURN. The PET then checks if the PLAY (or REWIND or FASTFORWARD) button is depressed. If not, it prompts you with PRESS PLAY ON TAPE #1. Once PLAY is pressed, it replies OK and SEARCHING. When it finds a program it prints FOUND FILENAME and checks if it is the one you asked for. If not, it continues searching. If it is correct, it prints LOADING and loads the program. When finished, the Basic pointers are adjusted and it prints READY.

The Atari appears to load a program like this: You type in CLOAD and hit RETURN (no file name is allowed). It beeps at you once and you then press play on your tape recorder and hit RETURN once again. It will load the program and print READY when done.

As you can see, the procedures are very different. Another difference is that the Atari clears out any program presently in memory when it encounters the command CLOAD, while the PET does not. For example: You type CLOAD (or LOAD) and hit RETURN. The Atari beeps. The PET prints PRESS PLAY ON TAPE #1. Now you decide to use the program presently in the computer instead, so hit BREAK(on the Atari) or STOP (on the PET) and try LIST. The PET will still list your old program. The Atari shows no program in memory.

Save a Program: PET saves a program in this manner: Type SAVE "PROGRAM" (or simply SAVE) and hit RETURN. The PET replies PRESS PLAY & RECORD ON TAPE #1 (unless the buttons are already down). Press them and it says OK WRITING PROGRAM. When done it says READY.

The PET allows you to VERIFY that a tape just SAVED is correct, while Atari apparently doesn't have this feature.

The Atari saves a program like this: Type CSAVE (no file name is allowed) and hit RETURN. It beeps twice. You must then press record and play on the tape unit, hit RETURN again and the Atari saves the program. It replies READY when done.

The procedural differences are again apparent here. Also note that the PET allows you to VERIFY that a tape just SAVED is correct, while Atari apparently doesn't have this feature.

With the usual SAVE or CSAVE the program is saved in its memory efficient token form. You can save it in its ASCII or untokenized form like this:

```
PET: type OPEN 1,1,1 : CMD1 : LIST

     then PRINT#1 : CLOSE 1


ATARI: type LIST"C1:"
```

To load programs saved this way into the PET, some trickery is involved. With the Atari it is rather simple using the Basic command ENTER. When through loading it is ready to RUN.

The difference in the two methods is that the program is normally saved in tokenized form (the first method). The second method (LIST) saves the program in its untokenized form.

Input

For the Atari, using the INPUT command is limited only to the amount that fits into one logical line (three screen lines). Let's look closer at this using this test program:

```
10 INPUT A

20 PRINT A
```

When it is RUN a question mark is printed as your prompt. I just typed in

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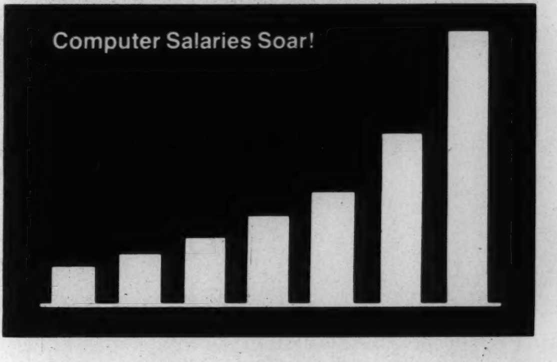

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CIRCLE 200 ON READER SERVICE CARD

Atari, cont'd...

1234567890123456... etc. past the end of the logical line. The PET and Atari treated this differently. Suppose we type a 7 at the end of the logical line and continue on the next line with 89 and then hit RETURN?

The PET prints 89 as the answer, ignoring the first logical line typed. The Atari prints 1234567890123456...567 as the answer. It accepts the first full logical line and ignores everything after that. This could use further testing, and I welcome comments.

Both allow string manipulation but in different ways.

There is another significant difference with the INPUT statement. The PET allows a "prompt" to be included such as:

```
10 INPUT"ENTER NAME PLEASE";N$
```

The Atari does not allow this. A PRINT statement must first be used such as:

```
10 PRINT"ENTER NAME PLEASE";
20 INPUT N$
```

Atari also does not allow you to INPUT into an array (PET does). You must first input into a dummy variable and then set the array element equal to that variable.

Restore

Both computers use the command RESTORE to allow DATA statements to be read again. Both start reading DATA from the first DATA line after a RESTORE. However, the Atari also lets you restore DATA lines beginning at whatever line you wish. For example:

```
10 DATA 10
20 DATA 20
30 DATA 30
40 READ A, B, C
50 PRINT A, B, C
70 GOTO 40
```

The above program produces an error on both computers since it can only read DATA once, and runs out of DATA when we GOTO 40. However, if we add:

```
60 RESTORE
```

Both computers continue printing:

```
10      20      30
10      20      30
10      20      30
etc.
```

The Atari will also allow you to RESTORE DATA beginning with any line, say line 30 in our example. I tried this:

```
10 DATA 10
20 DATA 20
30 DATA 30
40 READ A, B, C
50 PRINT A, B, C
60 RESTORE 30
70 READ A
80 PRINT A
```

The Atari gave this result:

```
10      20      30
30
READY
```

Notice that after RESTORED to line 30, it did not start with DATA in lines 10 or 20, but began at 30, as we instructed it. The PET does not have this feature.

And a Few More Differences

This is only supposed to be a partial comparison, not a book (and I need my time to write the books on Atari and PET that I am doing) so I will quickly mention a few more differences that may be significant.

Strings: One major difference is how each Basic treats strings. Both allow string manipulation, but in different ways, and Atari is a bit more complicated in my opinion. PET dynamically allocates strings as they are needed, and their lengths may vary throughout a program. However, Atari requires that all strings used be DIMed first, defining the maximum number of characters to be allowed in the string. Atari also doesn't allow string arrays, while PET does.

Adding strings together (concatenating) is very easy with a standard Microsoft Basic. Thus, the PET would allow you to add two strings together to get a third in this manner:

```
100 A$="TESTING"
110 B$="1234"
120 C$=A$+B$
130 PRINT C$
```

The result is: `TESTING1234`

To do the same thing on the Atari requires some tricky maneuvering as follows:

```
10 DIM C$(20), B$(20), A$(20)
100 A$="TESTING"
110 B$="1234"
120 C$=A$
130 C$(LEN(C$)+1)=B$
140 PRINT C$
```

The result is: `TESTING1234`

Most general Basic program listings will use the A$+B$ method.

Error Messages: If either computer hits an error, it will let you know (unless it is locked out — then the PET must be turned off and back on, while the Atari lets you hit SYSTEM RESET to get back, program intact). The PET prints a message such as BAD SUBSCRIPT ERROR, while the Atari only prints an error number. You then must look up that error number in the manual to see what went wrong.

Error Trapping: The Atari allows you to TRAP errors as they occur during a RUN of your program if you wish. For example:

```
100 TRAP 200
```

If an error occurs, control will be transferred to line 200. This gives you a chance to plan ahead with error handling routines. Different traps can be set throughout the program. PET doesn't have anything like this.

Conclusion

Both seem to be excellently designed, the PET for its all-in-one packaging, and the Atari for its modular approach including ROM, RAM, SOFTWARE and LANGUAGE cartridge modules. Both units are good looking and designed for ease of use. For example, the Atari SYSTEM RESET key is protected from accidental depression by thin plastic walls on two sides. I like that! The Atari has a convenient POWER ON indicator light. Since your TV screen can be ruined by leaving the same image on it for too long, the Atari keeps track of how long the unit has not been accessed. If several minutes go by it begins a color change routine and every few seconds all the color registers are changed.

Both computers seem to be very flexible and expandable units, and I am very happy with both. If high resolution and color graphics are important to you, then the Atari should catch your eye. It also has sound control built into its Basic. However, one voice sound capability is easily added to the PET with only two wires and an amplifier/speaker.

If several minutes go by it begins a color change routine and every few seconds all the color registers are changed.

Over the last two years a lot has been written about the PET, and a lot of software is commercially available for it. The Atari is a newcomer, but I am sure it also will become quite popular. Software is already popping up from second sources and user groups are forming. I hope this comparison was useful and I welcome comments. Remember that this article focused on the Atari, and many excellent advantages of the PET are not mentioned. It is hoped that seeing the Atari compared to a popular computer already well known will help your understanding of the new kid in town. ☐

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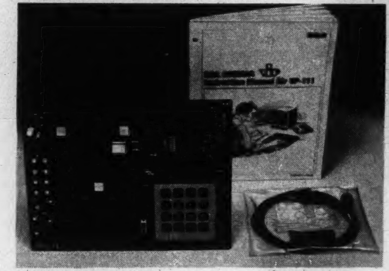

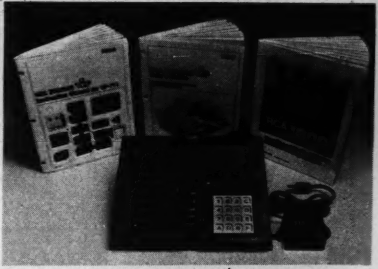

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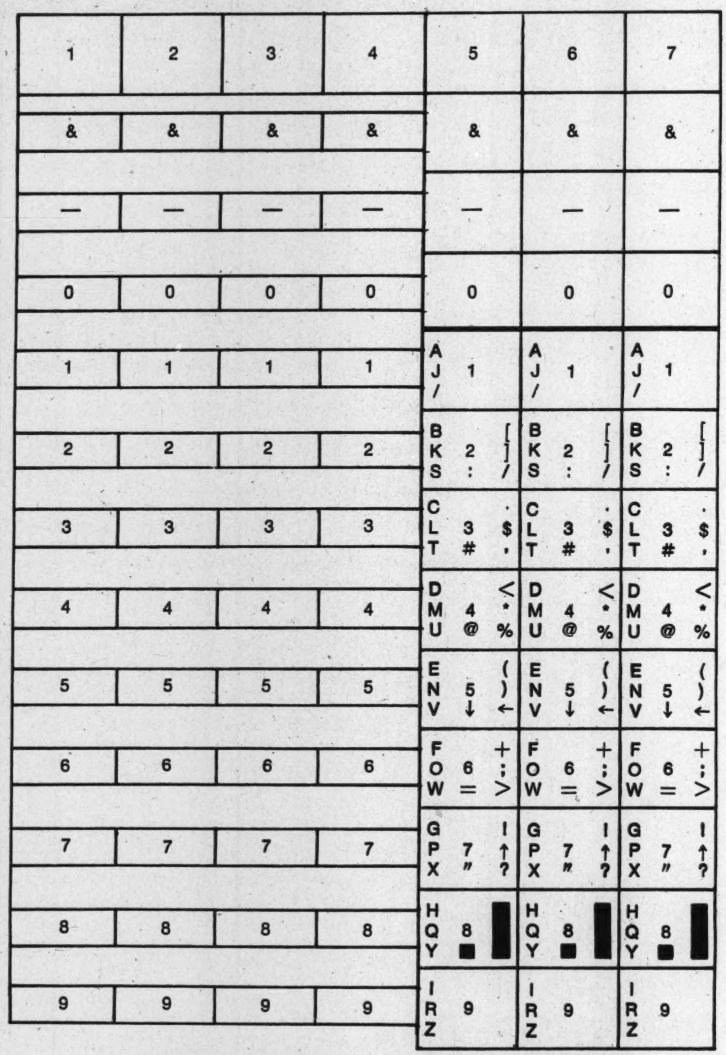

1	2	3	4	5	6	7
&	&	&	&	&	&	&
—	—	—	—	—	—	—
0	0	0	0	0	0	0
1	1	1	1	A J 1 /	A J 1 /	A J 1 /
2	2	2	2	B [K 2] S : /	B [K 2] S : /	B [K 2] S : /
3	3	3	3	C . L 3 $ T # ,	C . L 3 $ T # ,	C . L 3 $ T # ,
4	4	4	4	D < M 4 * U @ %	D < M 4 * U @ %	D < M 4 * U @ %
5	5	5	5	E (N 5) V ↓ ←	E (N 5) V ↓ ←	E (N 5) V ↓ ←
6	6	6	6	F + O 6 ; W = >	F + O 6 ; W = >	F + O 6 ; W = >
7	7	7	7	G ! P 7 ↑ X " ?	G ! P 7 ↑ X " ?	G ! P 7 ↑ X " ?
8	8	8	8	H ▮ Q 8 Y ■	H ▮ Q 8 Y ■	H ▮ Q 8 Y ■
9	9	9	9	I R 9 Z	I R 9 Z	I R 9 Z

Figure 1. Sample of the first 7 columns of a mark sense programming card. The cards have a total of 40 columns.

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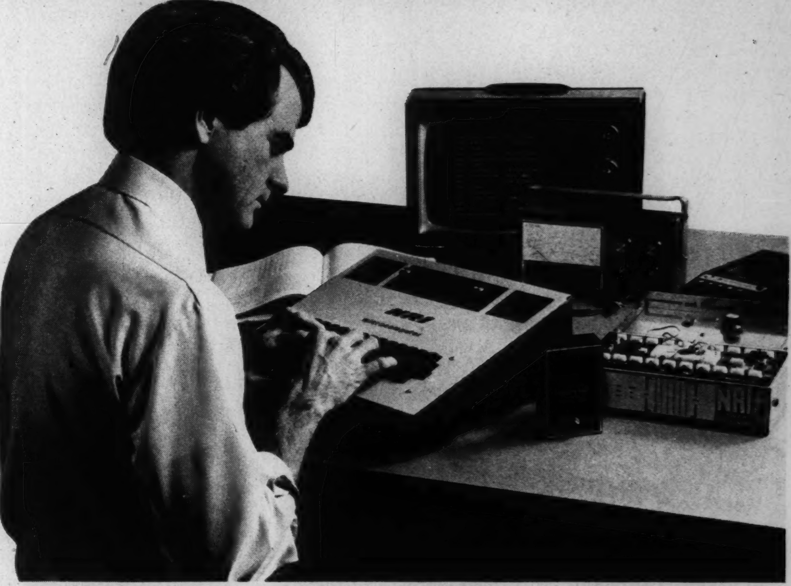

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It was a simple task to get the reader up and running with my Apple Plus II. The interface board was plugged into slot 4 of the Apple and the other end of the interface cord was attached to the reader. The AC/DC adapter was plugged into an electrical outlet and the reader was ready for its first performance. The computer was ready to accept information from the card reader after the "IN#4" command was typed and the return key hit. Returning to keyboard use was accomplished by marking a card with the "IN#0" command and feeding it through the reader. The "IN#4" and "IN#0" commands may also be used within programs to enter data from the reader.

Marking Programming Cards

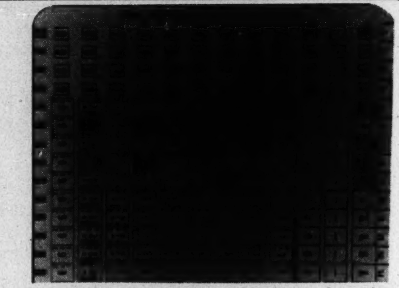
Figure 1 shows a portion of a programming card, drawn to an enlarged size. When marking a program, columns 1-4 are used for the line number. Columns 5-40 are marked for the Basic statement. The cards are marked using the standard Hollerith Code and a #2 pencil. Figure 2 shows the card symbols, symbol location within the boxes and the appropriate marking for the symbols. The following are a few examples of the correct markings required to enter data by card: To enter 0-9 numbers simply shade in the appropriate box of the number. Letters A-I are marked by shading the (&) box plus the box containing the letter. Examples are letter C marked by (&3), and F by (&6). Letters J-R are marked by the (-) box and the corresponding letter. Letter K is (- 2) with Q being a (- 8). Letters S-Z are marked in a similar way, shown in Figure 2. The symbols appearing at the bottom center of the boxes, below the numbers, are marked by a combination of (8) and the appropriate box. An equal sign, for example, is a (6 8) mark combination. The symbols to the right of the boxes are marked by combinations of one of the following (& - 0) plus (8) and the appropriate box containing the desired symbol. See Figure 2 for the exact combinations.

Entering Data

Entering a program is a simple procedure. Using the "IN#4" command the computer looks for information from the reader. Input all the cards, with the last being the "IN#0" command to return to the keyboard, and the program is ready to run. If it is desired to run the program by using the reader, then do not use the "IN#0" card and enter instead the "RUN" statement.

Several methods are available for entering variables into an existing program. I have found the easiest method to input a long list of variables is through the use of data statements. Mark the variables on a card, always using the same program line, so as not to accidentally destroy another line of the program. Enter the data statement before running the program. This procedure can easily be adapted for programs you already have by changing "INPUT" statements to "READ" statements through the program.

A second method of using the reader to input variables is to use the "IN#4" and "IN#0" commands within the program. The variables are entered through the reader when requested. If the program statement "INPUT A.B.C.D.E" is used, then an equal number of variables may be entered on a single card. However, each variable must be separated by a comma.



Shown is the correct marking for the statement 10 A = B + C.

SYMBOL LOCATION	SYMBOLS	MARKING
Center of Box	1 2 3 4 5 6 7 8 9 0	appropriate box
Top Left of Box	A B C D E F G H I	appropriate box plus (&)
Center Left of Box	J K L M N O P Q R	appropriate box plus (-)
Bottom Left of Box	/ S T U V W X Y Z	appropriate box plus (0)
Bottom Center of Box	: # @ = ″	appropriate box plus (8)
Top Right of Box	[. < (+ !	appropriate box plus (&) plus (8)
Center Right of Box	] $ *) ; ↑	appropriate box plus (-) plus (8)
Bottom Right of Box	/ ' % ← > ?	appropriate box plus (0) plus (8)
Carriage Return & 5 8 9		
Line feed 0 5 9		

Figure 2. Other ASC II characters can also be marked on the cards. An entire list with the correct marking codes are furnished with the reader instructions.

A third method to input variables is the use of a FOR-NEXT loop, again with the "IN#4" and "IN#0" commands within the program. See Figure 3 for a sample program using the FOR-NEXT loop. Use of the loop, however, requires that only one variable be marked on each card. This could lead to using a large number of cards.

```
400 IN#4
410 FOR I= 1 TO 10
420 PRINT "INPUT CARD"
430 INPUT A(I)
440 NEXT I
450 IN#0
```

Figure 3.

The FOR-NEXT loop above can be used to input variables into a program. The IN#4 command allows the computer to accept data from the reader and line 450 returns control to the keyboard.

Cost

Chatsworth Data is presently advertising the card reader, AC/DC converter and interface at $750. The cost of programming cards is $15/1000.

Thus far I have had no problems with the reader. It is a fantastic piece of computer equipment. Obviously I still use the keyboard to enter programs, but the card reader has made it possible for one microcomputer to handle programs from a full classroom of students. So, unless your school system can afford a dozen microcomputers, or you don't mind having 25 students waiting in line, you may want to join me as a rejoicing owner of a Chatsworth Data MR-500 Mark Sense Card Reader. ☐

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CIRCLE 121 ON READER SERVICE CARD

Reading Comprehension For The SOL-20

Randy Heuer

When writing a software package for use by those in the educational community, the program author is faced with three very real problems. First, the program must appeal in some way to the student. Without this, the students may become bored and spend more of his/her time trying to defeat the purpose of the software rather than devoting this time to learning. Second, most educators who must use the programs are rarely familiar with computers and are often quite afraid of them. Thus the software must be written so these fears can be overcome and user mistakes will be forgiven. Finally, and perhaps most difficult, the programmer must try to solve these two problems within the limitations of whatever computer system is chosen (microcomputer or otherwise). This problem may severely limit the extent to which the first two problems can be solved.

These were the major obstacles I foresaw when I undertook a reading comprehension project for a school district client of Creative Computing Software. The objective was to develop a student's reading comprehension through the use of a computer (in this case a SOL-20 with 32K of memory). Cassette based files were to be used so the teachers could create their own data tapes and the students could use them interchangably.

Basic Concepts

The following approach was taken toward developing basic reading comprehension skills! The student is presented with a brief short story which may take as long as he wants to read. After the student has finished reading the story, the program presents the student with several multiple choice questions about the story. At the teacher's option, the student may be given a limited amount of time to answer the questions.

I decided that the package would consist of three BASIC programs. Two of the programs would be used by the instructors to create the data tapes. The first, entitled TEXT, would be used to create, edit and copy the short story files. The second program, called QUES, would be used to create, edit and copy the question and answer file. The final program, QUIZ, would use the data tapes created with the first two programs to present the student with the exercise. (See Figure 1 to see how the three programs interact.)

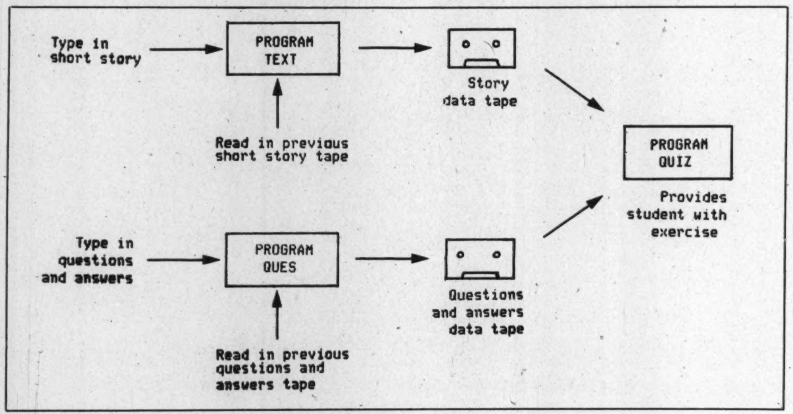
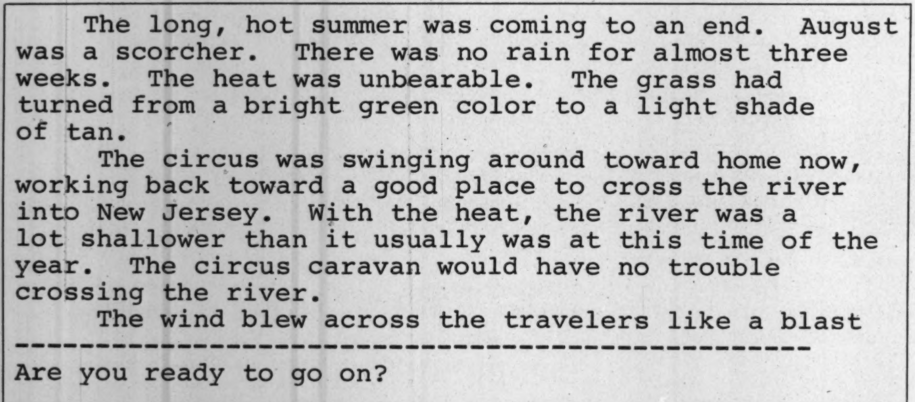

Type in short story
PROGRAM TEXT
Story data tape
Read in previous short story tape
PROGRAM QUIZ
Provides student with exercise
Type in questions and answers
PROGRAM QUES
Questions and answers data tape
Read in previous questions and answers tape

Figure 1



```
     The long, hot summer was coming to an end.  August
was a scorcher.  There was no rain for almost three
weeks.  The heat was unbearable.  The grass had
turned from a bright green color to a light shade
of tan.
     The circus was swinging around toward home now,
working back toward a good place to cross the river
into New Jersey.  With the heat, the river was a
lot shallower than it usually was at this time of the
year.  The circus caravan would have no trouble
crossing the river.
     The wind blew across the travelers like a blast
-------------------------------------------------
Are you ready to go on?
```

Example from QUIZ program - the first "page" of a story as presented to the student. To turn the page, the student presses the "Y" key.

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BASIC COMPILER	●	●	☐	●	
FORTRAN-80 COMPILER	●	●	☐	■	●
COBOL-80 COMPILER	●	●		●	
muMATH/muSIMP muLISP	●		☐		
MICROSEED DBMS	●				
EDIT-80 TEXT EDITOR	●		☐	■	
MACRO-80 ASSEMBLER	●	●	☐	■	●

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We set the standard.

```
-------------------------------------------------
When was the circus heading toward home?


1. In the spring
2. At the beginning of the summer
3. Near the end of the summer
4. In the winter
-------------------------------------------------
TIME REMAINING  2 MINUTES    0 SECONDS   YOUR ANSWER?
```

Example from QUIZ program - typical question as presented to the student.

```
     The long, hot summer was coming to an end.  August
was a scorcher.  There was no rain for almost three
weeks.  The heat was unbearable.  The grass had
turned from a bright green color to a light shade
of tan.
      The circus was swinging around toward home now,
working back toward a good place to cross the river
into New Jersey.  With the heat, the river was a
lot shallower than it usually was at this time of the
year.  The circus caravan would have no trouble

Do you want to continue Displaying?
```

TEXT program - using the display mode, the first ten lines of the story are displayed. If the user asks to insert a line after line 3 the computer will display...

How The Software Works

Designing software to accomplish the tasks outlined in Figure 1 is not particularly difficult, however, remember that these programs are to be used by people unfamiliar with computers. Thus the programs must be forgiving to incorrect input and self-instructing. These are the features that separate poor software from people-oriented software.

As outlined earlier, the extent to which these tasks can be accomplished is often dependent on the computer system used. For this project, a 32K SOL-20 was employed. Processor Technology's Extended Cassette BASIC requires approximately 15K of this memory. String variables for the data files and editing features occupy another 8K, leaving about 9K to store code and other variables.

With such stringent memory limitations, it was decided that extensive instructions would not be included in the programs. Instead the bulk of this free memory would be devoted to making the programs as user oriented (or "idiot-proof") as possible. In this way, users could press almost any key on the keyboard during prompts and the program would forgive any incorrect input. In addition, if the user wishes to make major changes to the file, the program will visually verify the changes requested and allow the user to change his mind. This feature keeps both experienced and inexperienced users from making silly mistakes and damaging their work.

The first program, TEXT, is used by the teacher to create, edit, and copy the short story data tapes. The short stories may be entered from the keyboard or loaded from an existing short story tape. When stories are entered from the keyboard, they are typed in just as they would be on a normal typewriter. Any mix of upper and lower case letters or numbers is permitted.

After the story is entered, the program proceeds to the editor routine. This part of the program allows the teacher to modify the story. The three edit operations allowed are DELETE, INSERT and CHANGE.

Regardless of which edit operation the teacher wishes to make, the first step is to display a group of ten lines. The story can be stepped through ten lines at a time until the teacher finds the line he wants to edit. At this point, the program will request the teacher to specify the type of edit operation desired (INSERT, DELETE or CHANGE), and ask which of the displayed lines is to be altered. After this information is entered, the program removes the line to be deleted or changed from the screen, or for the insert mode, placing a blank line where the teacher requested to insert a new line. The program then asks,

IS THIS THE LINE?

If the teacher has mistakenly chosen the wrong edit operation or the wrong line, the program now offers the user a way out without modifying any of the story. This is done by responding 'NO' to this inquiry. A 'YES' response will allow the desired modification to be made.

After all desired editing is accomplished, the program branches to the routine for saving the short story on cassette tape. This routine allows the user to make as many copies of the short story as needed.

The second program, QUES, is used by the teacher to create the question and answer data tape. Similar to the TEXT program, the questions and answers can be entered from the keyboard or from an existing data tape. Questions are of the multiple choice variety where each may have up to four possible answers. True-false questions are also acceptable.

This program also features an editor routine which allows the teacher to change either the questions, any of the answers or the number of the correct answers. Similar to the TEXT program, any part of the questions or answers the user requests to change, is displayed prior to the changes actually being made in memory. This feature helps prevent the user from accidently making undesirable changes.

The teacher also specifies at this time whether to place a time limitation for the student to answer the questions. If a time limit is chosen, the student will be required to answer

Comprehension, cont'd...

all the questions within the specified amount of time. Otherwise the student will have an indefinite amount of time to answer the questions.

After the teacher has completed the short story data tape and the question and answer data tape using the TEXT and QUES programs, the student can be presented the exercise using the QUIZ program. After reading both data files, the program first presents the student with the short story. The story is displayed twelve lines at a time, much as if the student was reading a book. The student "turns the page" by pressing the 'Y' key. Unlike a book, the student cannot turn back the page to review what he has read. Thus the student is required to try to comprehend what he is reading.

After the student has completed reading the story, he is presented with the multiple choice questions. The student is informed before he starts if there is a time limit to answer. Each question is displayed on the screen with its four possible answers and the time remaining. To answer the question, the student presses the key of the answer he thinks is correct. The computer will inform the student if he has chosen the correct answer.

If the student chooses the correct answer, the computer will proceed to the next question, otherwise the student must keep attempting the same question until he selects the correct answer. When all of the questions are answered, or if the student takes too much time, the program provides a numerical and descriptive evaluation of the student's results.

Did I Accomplish What I Wanted?

Now that the software is completed, did I solve the three problems I outlined at the beginning of the project? Let's look at them one at a time.

First, is the program enjoyable to use by the student? To an extent, I suppose this depends upon the individual using the program. I haven't attempted to make the subject of reading comprehension a game. The purpose of the program is a reading comprehension exercise. Some students will not find any exercise fun, no matter how it is done, but I believe most students will find the program challenging and will try to do the best they can. I'll have to wait for reports from the educational community to see if this is true.

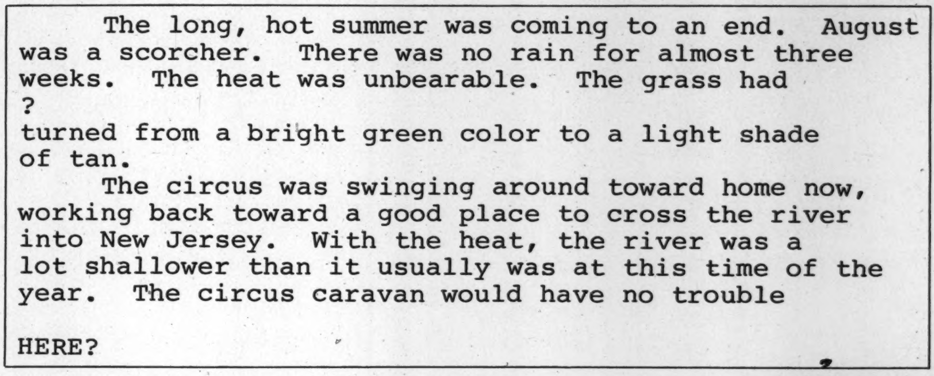
The second problem was to make the programs easy to use, particularly for the teachers. In this area I feel the programs accomplish all that can be expected. Each of the programs has been designed to accept any user input and provide help when receiving incorrect input. Major modifications to the user's work are first verified by features that display the changes the user requested before permanent changes are made. This helps eliminate making undesired changes accidentally.

The final problem to overcome was to solve the previous two problems within the limitations of the chosen computer system. Obviously, this has been accomplished. Other features such as disk based files and more memory for larger data files would be desirable, but were not included due to the limitations imposed. However, within these limitations this seems to be an effective method of strengthening reading comprehension skills.

A Reading Comprehension Package for the SOL-20 is available from Creative Computing Software. CS-8201 is a five cassette package designed for developing reading comprehension skills.

The package uses cassette based files to present a short story and accompanying multiple choice questions on the screen. Two of the programs are used for creating, copying and editing these files. Two other programs use these files to present the story and the quiz. The final tape contains a sample short story and questions. A 32-page instruction manual is included in the package.

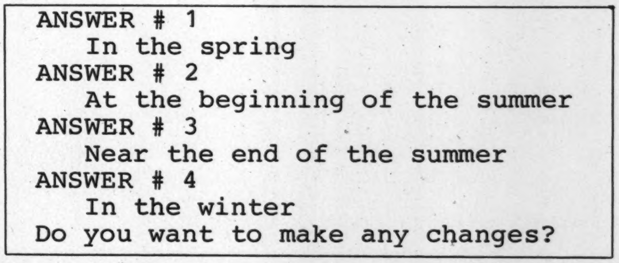
This package requires a SOL-20 with a minimum of 32K of memory and Processor Technology's Extended Cassette BASIC. The retail price of this package is $39.90.



```
     The long, hot summer was coming to an end.  August
was a scorcher.  There was no rain for almost three
weeks.  The heat was unbearable.  The grass had
?
turned from a bright green color to a light shade
of tan.
     The circus was swinging around toward home now,
working back toward a good place to cross the river
into New Jersey.  With the heat, the river was a
lot shallower than it usually was at this time of the
year.  The circus caravan would have no trouble

HERE?
```

...A blank line after the third line and an opportunity to back out of the insert mode. If the user responds "No" to the Here? Prompt, no changes will be made to the story. A "Yes" response will allow the desired changes to be made.



```
ANSWER # 1
    In the spring
ANSWER # 2
    At the beginning of the summer
ANSWER # 3
    Near the end of the summer
ANSWER # 4
    In the winter
Do you want to make any changes?
```

Example from QUES program - editing routine allows the user to view the present answers before making any changes.

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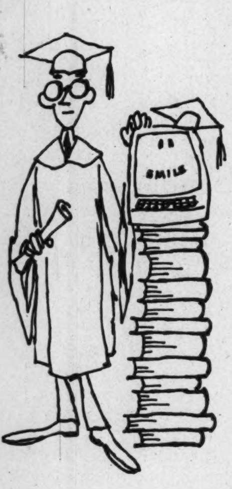

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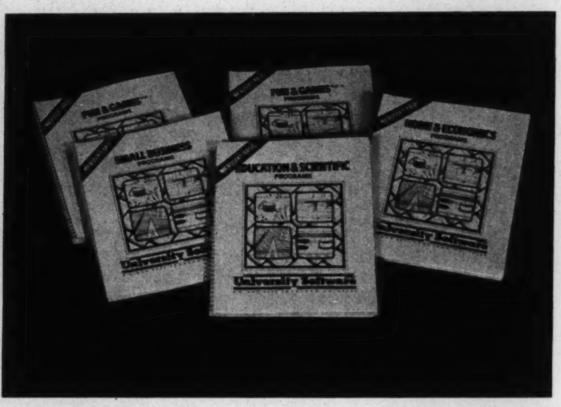

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CIRCLE 146 ON READER SERVICE CARD

Ancient Literature With Modern Computers

An Interview with Dia Philippides

By Mary Nicolopoulos

Dia Philippides, a doctoral student at Princeton University, was among the classical scholars attending the computer colloquium at the 1976 annual meeting of the American Philological Association held in New York December 28-30. I asked Miss Philippides to explain the link up between computers and the classics.

Q. How do computers help classical scholars in their work?

A. Computers can cut years off the time it would take to complete certain projects. Once a text is put on computer tape, computer programs can be applied to the text and time-saving miracles are performed. The computer can be programmed to analyze metric verse as one would analyze music for its structure and form. This is the type of work I am involved with—I am working on a project which will provide a better understanding of the meter used by the Greek tragedians in their spoken dialogue. The computer can also verify the authorship of a text through stylistic analysis by checking for a variety of factors such as the position of the verb in the line or the type and frequency of particles the author uses. The compilation of concordances, indices and dictionaries can be tremendously facilitated by the use of programs which instruct the computer to scan a text for a particular word and print it out along with the sentence or line in which it occurs.

Q. Are classical texts readily available on computer tape now?

A. Yes. The Thesaurus Linguae Graecae Project, headed by Ted Brunner of the University of California at Irving, has undertaken to put all of Greek literature on computer tape. So far they have computerized 18.5 million words of text and their goal is 90 million words. The availability of the computerized texts saves years of time for a scholar who would otherwise have to prepare and proofread his own tapes before beginning his analysis. If I were to sit down now and keypunch the 33 tragedies which my work involves, I would be here three years from now still punching. At present these tapes must be purchased rather than rented or borrowed and they are costly for an individual's budget. Eventually I foresee that certain universities will have the complete collection of Greek literature available in tape libraries.

Q. How long have classicists been using computers in their work?

A. I would say that the field is approximately ten years old. A. Q. Morton is one of the first in the field. With the help of monks in Scotland as volunteer keypunchers, he computerized Homer to facilitate his research. Since then other scholars have computerized various other works. Stephen Waite at Dartmouth College created a centralized repository for the American Philological Association to collect whichever Greek and Latin texts have been computerized and make them available to all interested scholars.

Q. Where is the main work being done in this field?

A. One of the leaders in this field in the United States is David Packard who is at the University of North Carolina at Chapel Hill. I have already mentioned Ted Brunner at Irving and Stephen Waite at Dartmouth. Now there are a couple of us in the New York area who are starting and a few in eastern Canada.

In Liege, Belgium, the Laboratory for the Statistical Analysis of Ancient Languages carries out much work of this nature. Several distinguished scholars are permanently in residence there while others take part on a visiting basis. The Laboratory has been publishing a quarterly periodical for ten years. The collaboration found at Liege is something which we do not have yet in the United States. The great distances between Chapel Hill, Irving, Dartmouth, etc., have caused efforts up to now to be largely individual ones.

Continued on page 45

Miss Dia Philippides with her computers.

INTRODUCING A GREAT WARGAME FOR TWO GREAT HOME COMPUTERS

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Z80 version requires 20K RAM. 8080 version requires 24K RAM. (Memory requirements are additional to CP/M and application program.)

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Q. I want to ask you about your own research but first tell us something about your Greek background since you seem to be one of the very few Greeks in this field.

A. My father is Greek, born in Athens. My mother is American and a classical archaeologist. She has a deep love for Greece, too. I was born in America but we moved to Greece when I was eight. My parents still live in Athens. I had the benefit of Greek schooling in Athens. I attended three different schools all of which were very good. Not knowing any Greek at the outset I managed, with the help of these schools, to graduate with the full credentials of any other Greek high school student. I am proud of the excellent school preparation that I had in Athens. The background that was given to me by my teachers both in math and in classics has enabled me to reach the stage that I am at now. I really would commend the Greek high school program for the preparation it gives one on which to base further training.

Q. How did you become interested in combining computers with classics?

A. I studied computer science as an undergraduate at Radcliffe. I have long been fascinated by the possibility of putting my computer background to work in a new and worthwhile application such as in the studies of Greek. The combination of the two fields requires a solid background in both. Developing the necessary skills took time. I had to study Greek and Latin for six or seven years before I could come back the full circle to using a computer in the study of Greek. Before the computer can be applied to anything one must have an idea of what is permissible and what is feasible in order to come up with valid results.

I attended the 1972 meeting of the Thesaurus Linguae Graecae in Athens. The discussion there of the project to put all of Greek literature on computer tape kindled my interest even further.

When I was faced with the decision of choosing a thesis topic I flew down to Chapel Hill to seek guidance from David Packard. It seemed possible to work with computer in classics but I had to determine which area to work in. From the topics that David Packard suggested, I chose to study the meter of the three Greek tragedians. He had advised me that although many computer-assisted studies had been made of the metrics of Homer, there were few of the spoken dialogue of the Greek tragedians. I have decided to examine more closely the meter used by Euripides since work has already been done on the meter of Aeschylus and Sophocles. I would like to be able to bring out elements which others can use in the future in discussions of Euripides and of tragedy in general.

Q. Can you explain your research in more detail?

A. The goal of the study is to examine closely the differences in style among the three tragedians and to investigate chronological progression and possibly development from the early works of an author to the late works. This may provide additional data to be considered in dating the plays.

To analyze the iambic trimeter used by the Greek tragedians will be quite a bit more complicated than the analyses which have already been done on the hexameter of Homer and of other Greek and Latin works. For the hexameter each line represents one of 32 possible metrical patterns while for the iambic trimeter there are 240 possible patterns. The computer will give me precise data on the structure of the trimeter. It will be able to provide figures on both 'outer' and 'inner' metric. Inner metric takes into consideration the breaks in the line and the words and their actual shapes.

In the total of tragedy, counting only the trimeter and not the choruses, there are 28,000 lines. So to do this by hand might be the work of several years. The most rational method of working it out is the computer. At times the computer will not be able to diagnose a syllable as either long or short since the three ambiguous vowels, alpha, iota and upsilon, can be either long or short. In such cases the computer will print a question mark and with the help of a dictionary I will assign the proper or the statistically more frequent value which also fits an acceptable trimeter pattern. One of the examples I have tried out is the word δάκρυ, "tear", which has two ambiguous syllables. I found that Euripides does not always use the same syllabic length when he employs this word. I would like to determine whether there is something which motivates his use of the word in one length in one context and then in another length in another. This might be indicative of development.

Q. Would you like to try something like this in Greece? Would it appeal to you?

A. It would be very exciting. Greece would be a natural place to work because it is Greek material that is being worked on, it is the Greek heritage —and Greek scholars of necessity would be most interested in it. ■

Reprinted from GREEK WORLD

For educators and authors

Computerized Testing For Readability

Donald Goodman
Sandra Schwab

We got to the point where we had to coax the paraprofessionals down off the walls about once a week by tossing them Valiums and promising to give them severance pay if they separated from their minds. It was a bad situation, but we really couldn't blame them since we had put them in that situation in the first place. We had all learned to tolerate a little moderate hysteria in our Personalized Achievement Lab, and even permitted screams if they were in good taste.

The problem was Flesch. Not the flesh that leads to corruption of the soul, but the Flesch that leads to a Readability Level. The road to hell may be paved with good intentions, but the road to insanity in a reading lab is paved with syllables: syllables that must be counted by the hundreds.

The road to hell may be paved with good intentions, but the road to insanity in a reading lab is paved with syllables: syllables that must be counted by the hundreds.

Paraprofessional Kathy Schrader counting out syllables using her fingers, just prior to uncontrolled outburst.

For a number of years the instructors in the Muskegon Community College Reading Lab had offered to run readability checks on text books which instructors in academic areas were either currently assigning or were considering adopting. However, we didn't advertise the service very widely because no one really wanted to do it. We were using the Flesch Readability Formula, an excellent device for giving a fairly accurate grade level on material which contains at least a hundred running words in each sample. But the formula requires that someone count the words in each sentence and count the syllables in the hundred words. Moreover, one passage is hardly an adequate sample. We felt that at least five or six were needed to accurately measure the readability of each text book. And damned if the instructors were going to do it. We gave it to the paraprofessionals.

Picture them: already harried from a phone that rings incessantly, earnestly trying to count out syllables in six samples of 100 words each from a stack of Nursing texts (how many syllables in vasodilation?) while a sad-eyed student is standing by confessing, "I've turned the knob the wrong way on the EDL machine and jammed the film all in the gears."

No wonder they climbed the walls.

Obviously something had to be done. That something sat cooly in the Math Lab on a confident green table, a placid, silent alternative to the mental storms erupting elsewhere. The para's called it Wanda Wang. The business office calls it a Wang 2200. We call it a computer.

The Training of Wanda

All we had to do was teach Wanda to count sentences and count syllables. She could then give us the average number of words per sentence and the total number of syllables per 100 words. We would plot that information on the Flesch chart, draw a line between the two numbers, and intersect the "grade level" markers telling the readability level. We could probably use it for the Fry Readability formula as well.

It was easy enough to teach Wanda to count words: every space indicates the end of a word.

She could easily note sentences: Periods, question marks, or exclamation marks indicate a sentence. We could have included semi-colons but we didn't.

Paraprofessional Kathy Schrader being told she no longer has to count syllables.

Counting syllables gave us the greatest challenge. After all, there are many not-very-good rules used to teach people how to break words into syllables: Noting certain prefixes and suffixes; watching for vowel-con-

---

Donald Goodman, Sandra Schwab, Muskegon Community College, Muskegon, MI 49442.

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muMATH and muSIMP were written by The Soft Warehouse, Honolulu, Hawaii. Priced at $74.95, the package includes muMATH, muSIMP and a complete manual. It requires a Model I TRS-80 with 32K and single disk. muMATH for the Apple II Computer will be available later this year.

You can buy muMATH and BASIC Compiler at computer stores across the country that carry Microsoft products. If your local store doesn't have them, call us. 206-454-1315. Or write Microsoft Consumer Products, 10800 Northeast Eighth, Suite 507, Bellevue, WA 98004.

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Testing, cont'd...

sonant-vowel groupings, and vowel-consonant - consonant - vowel patterns. Keeping an eye peeled for exceptions signaled by le, ck, ch, th, sh, gh and ph was another technique.

We couldn't teach Wanda to break words into syllables, obviously. She could only count them. But count what?

We were explaining to each other one day why it couldn't be done when the idea flashed upon us. A syllable is a vowel.

There are exceptions, but they are fairly regular and we can control them. There are exceptions to the exceptions, but we had faith that our beloved erratic English would sin as much on one side as another.

We tried many pairing-patterns, and made many arbitrary decisions, some of which had to be changed when we tested - and re-tested - the program.

But now it works. It includes words as well as abbreviations; it works well on long or short words, simple or difficult. A work-study student or paraprofessional can sit down at Wanda, load the program, type out 100 words, and wait for it all to happen.

All we had to do was teach Wanda to count sentences and count syllables.

Rules of the Road

There are six simple rules for the program: (The line numbers refer to the program instructions fed to Wanda)

1. The vowels are AEIOU and Y (Line Nos. 520 - 610) except at the beginning of a word. (Line 525 & 600 & 610)

Each individual vowel is a syllable except these combinations are one syllable:

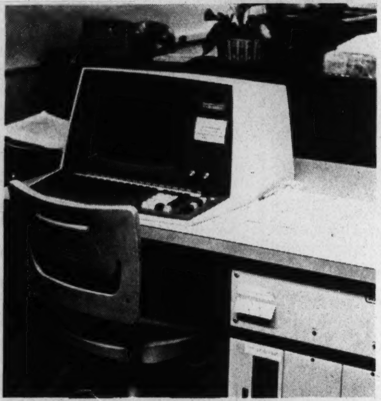
AA	EA	IA	OI	UA
AE	EE	IE	OO	UE
AI	EU	II	OU	UI
AU	EY	IY	OY	UU
AY		ION		UY

(Lines 520 - 610)

This means, by default, that the following combinations count as two syllables:

OE	AO
OA	EO
IO	IU
EI	UO

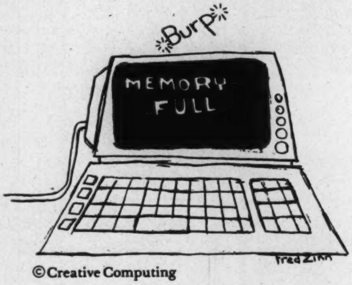
3. When E is found at the end of a word it is not a syllable except when it follows L or when it is the only vowel. (Lines 575 - 578) (Line 579)
4. ED is not a syllable unless it is the only syllable possible (No other counted vowel appears in the word) (Lines 580 - 589)



"That something sat cooly in the Math Lab on a confident green table."

5. ES, by default, is a syllable.
6. Every word has a syllable (This gives THE, as well as TV, PBB, 1979 and similar abbreviations and number clusters one syllable) (Lines 500-517)

In addition we have the following typing directions:
Type as Follows:



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ONLY type to the end of the viewing screen (width of 64 characters). The cursor will automatically jump to the next line if you type in the 64 position. You must use the backspace key to erase any characters that appear on the screen's next line. Press the return (exec) key - the cursor will disappear for a few seconds (it's counting the number of words you have entered); when it reappears a question mark will appear on the screen. Continue typing your information and repeat until the computer tells you that you have entered at least 100 words.

When typing look for the following:

1. commas - DO NOT enter any commas that appear in your text.
2. .!? Must be entered to signify the end of sentence. DO NOT use the period except at the end of the sentence. All other punctuation can be inserted or omitted at the typist's discretion. (: ; / ())
3. Hyphens - If used, Wanda will count the hyphenated word as one word. If the hyphen is omitted and replaced with a blank the separated words will be counted as two.
4. Apostrophes - Should not be used when a letter has been omitted. "Does not" when typed as "doesn't" will be counted as one word, two syllables. "Does not" will be counted as two words, three syllables.
5. Numbers and Abbreviations (without vowels) will be counted as one word and one syllable. DO NOT use periods unless you are at the end of the sentence. Abbreviations with vowels will follow the rules for the vowel syllable count.

We were explaining to each other one day why it couldn't be done when the idea flashed upon us. A syllable is a vowel.

The Doubtful Pairs

As we set up our paired-vowel rules, we found ourselves making tentative decisions, gambling that we would end up with the table odds. In some cases (calling ES a syllable but ED not a syllable) our decision was an out-and-out swap). In most cases we listed all the words we could think of containing those vowel combinations and made rational choices based on the likelihood of one over the other.

For instance, should OE be one syllable as in doe, foe, toe; or two as in poet, coerce, coefficient? Should

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Testing, cont'd...

OA be one syllable as in boat or coach; or two as in coagulate and coaxial? Should EI be one as in reign and sleigh; or two as in reinstate and reinvestigate?

In these cases we chose to consider the CO and RE as likely candidates for prefixes. In college-level material prefixes and suffixes abound. So, in all three cases we picked two syllables over one.

The IO combinations gave us trouble. Should we choose one as in notion, dominion, ration; or two as in bibliography, biology, biorhythm?

In this case we could have our cake and eat it, too. We called IO two syllables but ION one.

EO was interesting, since a word like **theory** is given either one or two, depending on which dictionary you read. We gave it two.

Like the amazing pedal-powered airplane, people may not like the way it looks or operates but the son-of-a-gun flies.

On the other hand we chose UA-1 over UA-2 (qualify over truant), IA-1 over IA-2 (partial over bias), UI-1 over UI-2 (quit over tuition) and IE-1 over IE-2 (belief over scientific).

Summary

What amazed us was that as we tacked the parts of the program together and tore them apart again things worked fairly well at all stages. The combination vowels threw the count off a little as we experimented, but not as much as we had anticipated.

Like the amazing pedal-powered airplane, people may not like the way it looks or operates but the son-of-a-gun flies.

"A paraprofessional can sit down at Wanda, load the program, type out 100 words, and wait for it all to happen."

We urge the reader to feed the program which follows into any computer of the sophistication level of the Wang 2200 and then compare the results with a "manual" or mental count. The results will be surprisingly close. We would also welcome refinements with open arms, and criticism with civility.

It is truly gratifying to know that in America today two people concerned with finding a way to get out of work, and armed with sincerity, dumb luck and a small computer, can conquer new worlds and keep the paraprofessionals off the walls. □

```
1  DIM T$(15)64
5 REM PROGRAM BY DONALD J. GOODMAN & SANDRA SCHWAB
10 PRINT :PRINT HEX(03),TAB(16),"FLESCH READABILITY SCALE"
12  PRINT "WHEN THE ? APPEARS ON THE LEFT OF THE SCREEN YOU MAY
TYPE IN THE100 WORD PASSAGE. WHEN YOU HAVE ENTERED AT LEAST 100
WORDS";
14 PRINT "WAIT & THE COMPUTER WILL COUNT THE AVERAGE NUMBER OF S
ENTENCES  WITHIN APPROXIMATELY 30 SECONDS, AND THE SYLLABLES COU
NT WITHIN ONE MINUTE"
16 PRINT "DO NOT TYPE BEYOND ONE WIDTH OF THE SCREEN"
18 REM C ALLOWS UP TO 15 LINES OF TEXT TO BE ENTERED. USUALLY 10
0 WORDS WILL BE COUNTED BEFORE THE END OF THE 15 LINES
19 REM IF THE TEXT IS VERY DIFICULT INCREASE C--BE WARE OF OVERF
LOW
20 FOR C= 1 TO 15
29 REM T$() IS USED FOR STORING EACH LINE OF YOUR TEXT
30 INPUT T$(C)
39 REM M IS SET EQUAL TO 64(FULL LENGTH OF SCREEN) UNTIL IT FIND
S THE 100TH WORD & Q= COUNTER FOR THE CHARACTERS IN EACH LINE
40 M=64
100 FOR Q=1 TO M
110 IF STR(T$(C),Q,1)=" " THEN 150
111 IF STR(T$(C),Q,1)="." THEN 140
112 IF STR(T$(C),Q,1)="?" THEN 140
113 IF STR(T$(C),Q,1)="!" THEN 140
115 IF Q>M  THEN 250
120 NEXT Q
130 GOTO 250
139 REM S= NUMBER OF SENTENCES
140 S=S+1
```

Testing, cont'd...

```
145 GOTO 115
150 IF STR(T$(C),Q+1,1) <>" " THEN 190
160 FOR K=Q TO 64
170 IF STR(T$(C),K,1)<>" " THEN 190
180 NEXT K
185 Q=K
189 REM W= NUMBER OF WORDS
190 W=W+1
210 IF W<100 THEN 115
220 PRINT :PRINT TAB(9);"YOU HAVE ENTERED MORE THAN 100 WORDS LE
T THE",TAB(15);"COMPUTER DO THE CALCULATIONS"
230 GOTO 430
250 NEXT C
430 IF S>=1 THEN 450
440 PRINT "YOU DO NOT HAVE A COMPLETE SENTENCE WITHIN YOUR 100 W
ORDS.":GOTO 499
450 PRINT "AVERAGE NUMBER OF WORDS IN EACH SENTENCE =  ",100/S
490 REM J= COUNTER FOR THE NUMBER OF LINES USED FOR YOUR 100 WOR
DS
499 M=64
500 FOR J=1 TO C
501 FOR Q=1 TO M
505 IF STR(T$(J),Q,1)<>" " THEN 520
506 IF Q= 1 THEN 530
507 IF STR(T$(J),Q-1,1)=" " THEN 530
508 FOR N=1 TO 10:IF Q-N<=0 THEN 700
509 IF STR(T$(J),Q-N,1)=" " THEN 700
510 IF STR(T$(J),Q-N,1)="A" THEN 517
511 IF STR(T$(J),Q-N,1)="E" THEN 517
512 IF STR(T$(J),Q-N,1)="I" THEN 517
513 IF STR(T$(J),Q-N,1)="O" THEN 517
514 IF STR(T$(J),Q-N,1)="U" THEN 517
515 IF STR(T$(J),Q-N,1)="Y" THEN 517
516 NEXT N:GOTO 710
517 N=10:GOTO 516
520 IF STR(T$(J),Q,1)="A" THEN 540
521 IF STR(T$(J),Q,1)="E" THEN 575
522 IF STR(T$(J),Q,1)="I" THEN 550
523 IF STR(T$(J),Q,1)="O" THEN 560
524 IF STR(T$(J),Q,1)="U" THEN 540
525 IF STR(T$(J),Q,1)="Y" THEN 600
530 NEXT Q:GOTO 720
540 IF STR(T$(J),Q+1,1)="I" THEN 620
541 IF STR(T$(J),Q+1,1)="A" THEN 620
542 IF STR(T$(J),Q+1,1)="E" THEN 620
543 IF STR(T$(J),Q+1,1)="U" THEN 620
544 IF STR(T$(J),Q+1,1)="Y" THEN 620
545 GOTO 700
550 IF STR(T$(J),Q+1,1)="E" THEN 620
551 IF STR(T$(J),Q+1,2)="ON" THEN 620
552 IF STR(T$(J),Q+1,1)="A" THEN 620
553 IF STR(T$(J),Q+1,1)="I" THEN 620
554 IF STR(T$(J),Q+1,1)="Y" THEN 620
559 GOTO 700
560 IF STR(T$(J),Q+1,1)="I" THEN 620
561 IF STR(T$(J),Q+1,1)="O" THEN 620
562 IF STR(T$(J),Q+1,1)="Y" THEN 620
563 IF STR(T$(J),Q+1,1)="U" THEN 620
565 GOTO 700
575 IF STR(T$(J),Q+1,1)="." THEN 579
576 IF STR(T$(J),Q+1,1)="!" THEN 579
577 IF STR(T$(J),Q+1,1)="?" THEN 579
578 IF STR(T$(J),Q+1,1)<>" " THEN 580
579 IF STR(T$(J),Q-1,1)="L" THEN 700:GOTO 582
580 IF STR(T$(J),Q+1,1)<>"D" THEN 541
582 FOR N=1 TO 10:IF Q-N<=0 THEN 700
583 IF STR(T$(J),Q-N,1)=" " THEN 700
584 IF STR(T$(J),Q-N,1)="A" THEN 595
585 IF STR(T$(J),Q-N,1)="E" THEN 595
586 IF STR(T$(J),Q-N,1)="I" THEN 595
587 IF STR(T$(J),Q-N,1)="O" THEN 595
588 IF STR(T$(J),Q-N,1)="U" THEN 595
589 IF STR(T$(J),Q-N,1)="Y" THEN 595
590 NEXT N:GOTO 710
595 N=10:GOTO 590
600 IF Q=1 THEN 710
610 IF STR(T$(J),Q-1,1)=" " THEN 710
619 REM Q IS A COUNTER FOR DETERMINING THE END OF A LINE OR THE
END OF THE 100TH WORD
620 Q=Q+1
699 REM A IS THE COUNTER FOR THE NUMBER OF SYLLABLES
700 A=A+1
710 IF Q<M THEN 530
720 IF J<C-1 THEN 740
730 M=L
740 NEXT J
800 PRINT "TOTAL NUMBER OF SYLLABLES IN YOUR 100 WORDS IS",A
810 PRINT :PRINT :PRINT TAB(9);"IF YOU WISH TO ENTER ADDITIONAL
PASSAGES PRESS:",TAB(16);"RUN AND THE RETURN(EXEC) KEYS"
```

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Sentence Construction With A Computer

Robert L. Williams

A lexical verb alone:
Sue helps her teacher.

The program described in this article, Abecedarian, is more a demonstration of some advanced techniques for natural language construction on a computer than a practical application. It's an interesting and worthwhile effort in its own right, but you may enjoy experimenting with the program. It's also a nice start in developing English CAI software (although the author points out that "Context is a massive problem in English CAI. Many folks just aren't aware of it.").

The program was designed for narrow screens and "standard" Basic so conversion shouldn't be too difficult. Note that the code uses string arrays and "&" as a string concatenation operator.

—SN

Abecedarian is a Basic program which attempts to show a portion of the English finite verb system at work. Abecedarian writes sentence-like constructions that show some of the ways a cluster of six closely related transitive lexical verbs, four modal verbs and two auxiliary verbs may appear separately or together.

1. A lexical verb alone:
   Sue *helps* her teacher.
2. The modal verb *will* added:
   Sue *will* help her teacher.
3. The auxiliary verb *have* added:
   Sue will *have* helped her teacher.
4. The auxiliary verb *be* added:
   Sue will have *been* helping her teacher.
5. An additional *be* added:
   Sue's teacher will have *been being* helped by her.

The last sentence-like construction may have tweaked your ear. If so, you've probably already determined that by the time you get the program into your processor your leg will have been being pulled far too long by Abecedarian. At that time it certainly should feel as if it had been being pulled. "Enough," you cry, "I have been being led astray by this paragraph!"

Actually, not one of the sentence-like constructions above is an "acceptable" sentence. They don't appear in contexts that allow them to be accepted as "live" sentences by you. A context is needed for the first sentence as much as one is needed for the last. For example, who is Sue? She hasn't been introduced. I'll do so now: Sue is a friend of mine. Now, assuming we both know of her and

Example 1

```
  1 >> JOE ANSWERS HIS LIBRARIAN.
            A SECOND FORM OF 1 IS:
         JOE DOES ANSWER HIS LIBRARIAN.

HAD SUE AND JOE'S CLASSMATES BEEN ANGERED BY THEM?
 26 >> YES, THEY HAD.

HAD MY CLASSMATE BEEN ANSWERED BY ME?
 26 >> YES, SHE HAD.

 23 >> WERE YOU BEING HELPED BY YOUR CLASSMATES?

 25 >> HAD JOE QUESTIONED HIS FRIENDS?

ARE YOU ANGERED BY YOUR FRIEND?
 2 >> YES, I AM.

HAD JOE'S LIBRARIANS BEEN HELPING HIM?
 28 >> YES, THEY HAD.

HAS JOE HELPED HIS LIBRARIANS?
 8 >> YES, HE HAS.

DID WE HELP OUR TEACHERS?
 16 >> YES, WE DID.

 27 >> HAD YOU BEEN ANSWERED BY YOUR LIBRARIAN?

DO I AID MY LIBRARIAN?
 0 >> YES, YOU DO.

 1 >> YOU QUESTION YOUR CLASSMATES.
          A SECOND FORM OF 1 IS:
       YOU DO QUESTION YOUR CLASSMATES.

 23 >> WAS JOE BEING ANSWERED BY HIS CLASSMATE?

DID SUE AND JOE'S HALL GUARDS QUESTION THEM?
 16 >> YES, THEY DID.

 3 >> IS MY TEACHER QUESTIONED BY ME?

 29 >> HAD SUE'S VISITORS BEEN AIDING HER?

 9 >> HAS JOE ANSWERED HIS FRIEND?

 23 >> WERE YOUR VISITORS BEING AVOIDED BY YOU?

 7 >> IS SUE'S HALL GUARD BEING QUESTIONED BY HER?

ARE YOU BEING AVOIDED BY YOUR TEACHERS?
 6 >> YES, I AM.

 21 >> WERE SUE AND JOE'S HALL GUARDS ANGERING THEM?

 19 >> WERE YOUR LIBRARIANS AVOIDED BY YOU?

 23 >> WERE WE BEING ANGERED BY OUR FRIEND?

HAVE SUE AND JOE BEEN AIDED BY THEIR TEACHER?
 10 >> YES, THEY HAVE.
```

Robert L. Williams, Ed.D. Assistant to the Academic Vice President, St. John's University, New York, Jamaica, NY 11439.

Books For Classroom And Self Teaching

ALL GRADE LEVELS

Computers in Mathematics: A Sourcebook of Ideas

Here is a huge sourcebook of ideas for using computers in mathematics instruction. This large format book contains sections on computer literacy, problem solving techniques, art and graphing, simulations, computer assisted instruction, probability, functions, magic squares and programming styles.

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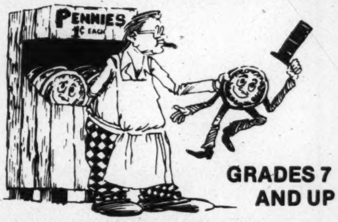
Much of the material has appeared in **Creative Computing** but the back issues are no longer available. Hence this is your only source to this practical and valuable material. Edited by David H. Ahl, this mammoth 224-page softbound book costs only $15.95. (The individual issues, if they were available, would cost over $60.00). [12D]

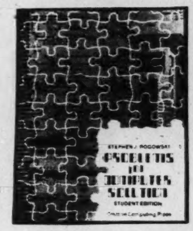
* * *



GRADES 7 AND UP

Computer Coin Games

Computer Coin Games by Joe Weisbecker aids newcomers to the field of computers by simplifying the concepts of computer circuitry through games which can be played with a few pennies and full sized playing boards in the book. Enhanced by outrageous cartoons, teachers, students and self-learners of all ages will enjoy this 96 page softbound book. [10R] $3.95.



Problems for Computer Solution

Stephen J. Rogowski

GRADE 9 AND UP

Here are 90 problems with a thorough discussion and references for each. Eleven types of problems are included, for example, arithmetic, algebra, geometry, number theory, probability and science. Even includes three classic unsolved problems and seven appendices. 104 pages softbound, $4.95 [9Z].

The teacher's edition contains solutions with complete listing in Basic, sample run and in-depth analysis explaining the algorithms and theory involved. 280 pp softbound, $9.95 [9Y].

* * *

The Impact of Computers on Society and Ethics: A Bibliography

REFERENCE

Gary M. Abshire.

Where is the computer leading us? Is it a menace or a messiah? What are its benefits? What are the risks? What is needed to manage the computer for society's greatest good? Will we become masters or slaves of the evolving computer technology? This bibliography was created to help answer questions like these. It contains 1920 alphabetical entries of books, magazine articles, news items, scholarly papers and other works dealing with the impact of computers on society and ethics. Covers 1948 through 1979. 128 pp hardbound. $17.95. [12E].

* * *

GRADES 3 TO 8

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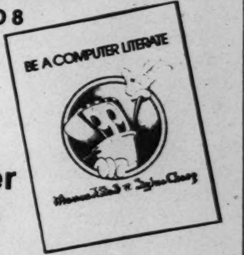
This fun and educational new board game is based on a large-scale multiprocessing computer system. The object is to move your three programs from input to output. Moves are determined by the roll of three binary dice representing bits in a computer. Hazards include priority interrupts, program bugs, decision symbols, power failures and restricted input and output channels. Notes are included for adapting game for school instruction. A perfect introductory tool to binary math and the seemingly-complex computer. [6Z] **$8.95.**

GRADES 4 TO 8



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* * *

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The first two years of **Creative Computing** magazine have been edited into two big blockbuster books. **American Vocational Journal** said of Volume 1, "This book is the 'Whole Earth Catalog' of computers." [6A] Volume 2 continues in the same tradition. "Non-technical in approach, its pages are filled with information, articles, games and activities. Fun layout." **—American Libraries.** [6B] Each volume $8.95.

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Construction, cont'd . . .

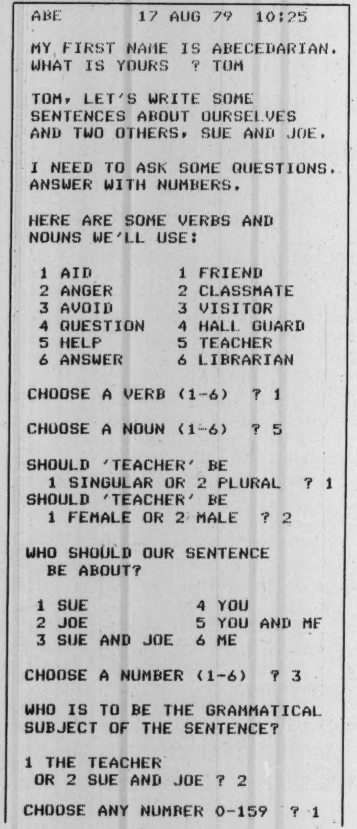
that we know she has just one teacher —not more—would I say to you, "Sue helps her teacher?" Not likely. I might say "Sue *often* helps her teacher" or "Sue *sometimes* helps her teacher." Or I could say "Sue helps her teacher *whenever she can* ." In this instance, an adverb of frequency like *often* or an additional clause is needed. When we utter or write sentences we usually do so with understood contexts, contexts that give a point in time, a set of characters and a set of facts and events that we share with our listener or reader.

ABE doesn't offer appropriate contexts that include all of these features. Consequently, many of her sentence-like constructions may seem to offend your ear. All of them should.[1]

In one of her tantrums before she was three days old, ABE randomly rambled:

(Refer to Example 1)

At that time she was only happy with a 64 character screen. Here is a view of adolescent ABE conversing with a helpful friend with a smaller screen:



```
ABE          17 AUG 79  10:25

MY FIRST NAME IS ABECEDARIAN.
WHAT IS YOURS  ? TOM

TOM, LET'S WRITE SOME
SENTENCES ABOUT OURSELVES
AND TWO OTHERS, SUE AND JOE.

I NEED TO ASK SOME QUESTIONS.
ANSWER WITH NUMBERS.

HERE ARE SOME VERBS AND
NOUNS WE'LL USE:

 1 AID          1 FRIEND
 2 ANGER        2 CLASSMATE
 3 AVOID        3 VISITOR
 4 QUESTION     4 HALL GUARD
 5 HELP         5 TEACHER
 6 ANSWER       6 LIBRARIAN

CHOOSE A VERB (1-6)  ? 1

CHOOSE A NOUN (1-6)  ? 5

SHOULD 'TEACHER' BE
  1 SINGULAR OR 2 PLURAL  ? 1
SHOULD 'TEACHER' BE
  1 FEMALE OR 2 MALE  ? 2

WHO SHOULD OUR SENTENCE
  BE ABOUT?

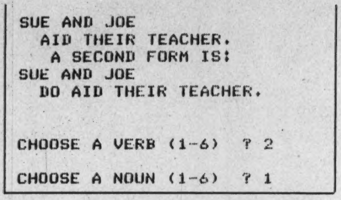
 1 SUE            4 YOU
 2 JOE            5 YOU AND MF
 3 SUE AND JOE    6 ME

CHOOSE A NUMBER (1-6)  ? 3

WHO IS TO BE THE GRAMMATICAL
SUBJECT OF THE SENTENCE?

1 THE TEACHER
 OR 2 SUE AND JOE ? 2

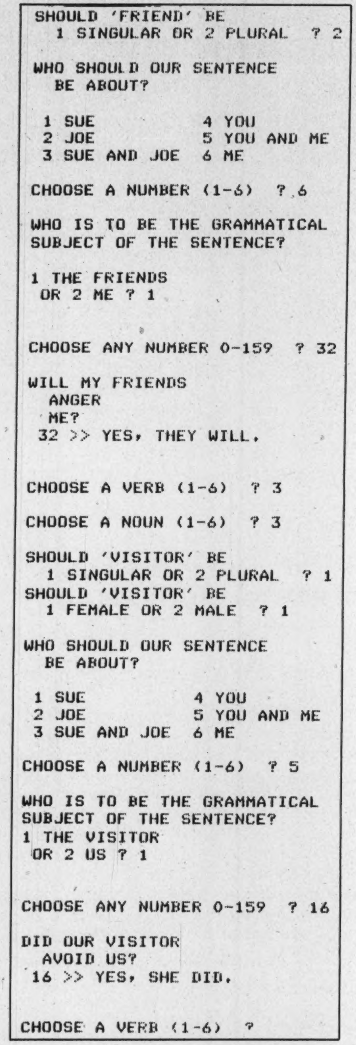
CHOOSE ANY NUMRER 0-159  ? 1
```



```
SUE AND JOE
  AID THEIR TEACHER.
   A SECOND FORM IS:
SUE AND JOE
  DO AID THEIR TEACHER.


CHOOSE A VERB (1-6)  ? 2

CHOOSE A NOUN (1-6)  ? 1
```



```
SHOULD 'FRIEND' BE
  1 SINGULAR OR 2 PLURAL  ? 2

WHO SHOULD OUR SENTENCE
  BE ABOUT?

 1 SUE            4 YOU
 2 JOE            5 YOU AND ME
 3 SUE AND JOE    6 ME

CHOOSE A NUMBER (1-6)  ? 6

WHO IS TO BE THE GRAMMATICAL
SUBJECT OF THE SENTENCE?

1 THE FRIENDS
 OR 2 ME ? 1


CHOOSE ANY NUMBER 0-159  ? 32

WILL MY FRIENDS
  ANGER
  ME?
 32 >> YES, THEY WILL.


CHOOSE A VERB (1-6)  ? 3

CHOOSE A NOUN (1-6)  ? 3

SHOULD 'VISITOR' BE
  1 SINGULAR OR 2 PLURAL  ? 1
SHOULD 'VISITOR' BE
  1 FEMALE OR 2 MALE  ? 1

WHO SHOULD OUR SENTENCE
  BE ABOUT?

 1 SUE            4 YOU
 2 JOE            5 YOU AND ME
 3 SUE AND JOE    6 ME

CHOOSE A NUMBER (1-6)  ? 5

WHO IS TO BE THE GRAMMATICAL
SUBJECT OF THE SENTENCE?
1 THE VISITOR
 OR 2 US ? 1


CHOOSE ANY NUMBER 0-159  ? 16

DID OUR VISITOR
  AVOID US?
 16 >> YES, SHE DID.


CHOOSE A VERB (1-6)  ?
```

As you've noted, whenever you converse with ABE she asks you to choose the lexical verbs and nouns she's to gossip with. She then insists that you tell her whether the chosen noun is to be singular or plural. If the noun is to be singular, she asks whether it's to be a female or male person. ABE likes to satisfy her friends. She then asks who else is to be gossiped about, other friends, you, herself, or the two of you. Being precisely persistent, she then asks you to designate who's to be the grammatical subject. But in the end, she's all heart: she composes the predicates by herself. After all, she wouldn't want you to walk away saying that your leg had been being pulled. What ABE does do by herself is to string verb constructions together in a manner to suggest the extensiveness and some of the complexities of just a portion of the finite verb system.

You've probably already determined that by the time you get the program into your processor your leg will have been being pulled far too long by Abecedarian.

ABE's six lexical verbs are transitive ones, those that may be followed by objects.

Subject	Verb	Object
Sue	helps	her teacher (1)

Transitive verbs permit constructions that "reverse" subjects and objects.

Subject	Verb	Object (Agent)
Sue's teacher	is helped	by her (3)

Many of the verb constructions that ABE writes assume this reversal. You may enjoy selecting some other lexical verbs to teach a clone of ABE's. If you do, keep in mind that all of the subjects and objects are human.

What little grammar ABE has learned is to be found in a small portion of Martin Joos' **The English Verb: Form and Meaning.**[2] Joos postulates a binary schema that assigns either/or "values" to several features of finite verb predications. In turn, these values can be expressed in decimal numbers. His schema shows that all finite predications (verbs) may be described or coded with a five-place binary number.

ABE accepts decimal numbers. The numbers that describe verb constructions range from 1 through 159.[3] ABE analyzes these numbers in the subprogram 2610 through 2860. Essentially, she first strips off the modal values, if there are any, in lines 2660 through 2720, assigning a modal code. The remainder of the number (31-0) is then passed through a loop that assigns "binary" values to tense, phase, aspect, voice and function, terms and features far too complex to discuss here but to be found in Joos' book. ABE makes numerous other decisions to handle "number" agreement between the verbs and subjects

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Construction, cont'd . . .

chosen. Among others, for example, 5 may produce these constructions:

> Sue *is* helping her teacher.
> You *are* helping your teacher.
> I *am* helping my teacher.
> Sue's teachers *are* helping her.

In these sentences, the *be* verb forms must agree in number with their subjects.

With the exceptions of 1 and 17, ABE writes her sentence-like constructions in yes/no question forms:

Whenever you converse with ABE she asks you to choose the lexical verbs and nouns she's to gossip with.

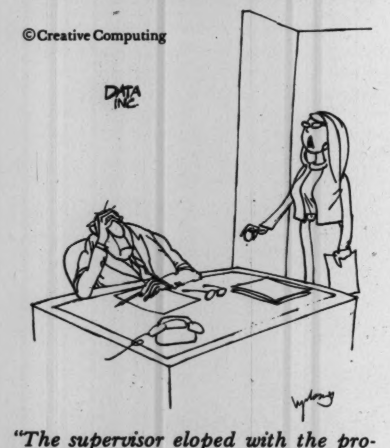
With the exceptions of 1 and 17, ABE writes her sentence-like constructions in yes/no question forms:

> Is Sue helping her teacher? (5)
> Is Sue being helped by her teacher? (7)

All odd numbers cause ABE to write "full" verb constructions—like *is helping* and *is being helped* above. Assuming the sentence characters are contextually "accepted" by you, questions seem to help lessen other context needs somewhat. But they also serve another purpose.

In Joos' schema even numbers account for "propredicates," features that most of us have traditionally called elliptical verbs.

> Is Sue helping her teacher? (5)
> 4 Yes, she is. (helping her teacher)



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"The supervisor eloped with the programmer..."

The yes response is followed only by a restatement of the subject—in pronoun form—and the auxiliary *is.* Since the lexical verb *helping* and the object *her teacher* don't appear, the verb construction in the response isn't "complete:" it's elliptical, or, as Joos notes, it's a *pro*predicate, in the manner of a *pro*noun standing in place of a noun. When an even numbered predicate is given to ABE, she writes the appropriate odd numbered question first and then writes a response to represent the even numbered elliptical or propredicate form. If 32 is given to ABE, she may write the following:

> Will Sue help her teacher? (33)
> 32 Yes, she will.

You and ABE herself are sometimes characters when ABE writes, first and second persons. Whenever you determine ABE to be the subject of a sentence, she will produce a question about herself, sometimes in this form:

In the end, she's all heart: she composes the predicates by herself.

> Am I helping my teacher? (5)

As the person being addressed, you may find yourself thinking "If you don't know, who does!" or "How stupid to ask!" This is a problem of context, of sorts. However, if you give ABE the number 4, she may do the following:

> Am I helping my teacher? (5)
> (ABE asks about herself)
> 4 Yes, you are.
> (As if you are replying)
> Are you helping your teacher? (5)
> (ABE asks about you)
> 4 Yes, I am.
> (As if you are replying)

Thus, whenever ABE is given *you* or *me* to write about, she assumes first person in asking a question and you then in turn are assumed to be a first person giving a response.

Let's note some aspects of ABE's personality in the event you wish to clone her. First, she seems to be content to write on a 32 or 40 character screen. Second, she concatenates at times: lines 750, 1050, 1070 and 1150. Your clone may require minor surgery in these instances. Third, ABE learns her vocabulary by loop reading. If your clone is to MAT READ, you will need to rearrange some of her data dictionary. And, fourth, ABE doesn't understand ON...GO TO or ON...GO SUB: she loves to *IF* herself silly. Should your clone prefer not to be so iffy, there are some places ON's would prove helpful; but you should perform such microsurgery carefully.

Although ABE knows few words, she does seem to write a great deal, even though she always writes tongue out of context, not in cheek. □

Although ABE knows few words, she does seem to write a great deal, even though she always writes tongue out of context, not in cheek.

```
100 DIM A$(6),D$(6),E$(6),F$(6)
110 DIM H$(6),B$(8),G$(9),C$(18),L(5)
120 FOR X=1 TO 6
130 READ A$(X)
140 READ D$(X)
150 READ E$(X)
160 READ F$(X)
170 READ H$(X)
180 NEXT X
190 FOR X=1 TO 8
200 READ B$(X)
210 NEXT X
220 FOR X=1 TO 9
230 READ G$(X)
240 NEXT X
250 FOR X=1 TO 18
260 READ C$(X)
270 NEXT X
280 PRINT "MY FIRST NAME IS ABECEDARIAN."
290 PRINT "WHAT IS YOURS  ";
300 INPUT Z$
310 IF Z$=G$(1) THEN 350
320 IF Z$=G$(2) THEN 350
330 LET Z=0
340 GO TO 360
350 LET Z=3
360 PRINT
370 PRINT Z$;", LET'S WRITE SOME"
380 PRINT "SENTENCES ABOUT OURSELVES"
390 PRINT "AND TWO OTHERS, ";G$(Z+3);"."
400 PRINT
410 PRINT "I NEED TO ASK SOME QUESTIONS."
420 PRINT "ANSWER WITH NUMBERS."
430 PRINT
440 PRINT "HERE ARE SOME VERBS AND"
450 PRINT "NOUNS WE'LL USE:"
460 PRINT
470 FOR X=1 TO 6
480 PRINT X;E$(X);TAB(13);X;F$(X)
490 NEXT X
500 FOR X=1 TO 25
510 PRINT
520 PRINT "CHOOSE A VERB (1-6)  ";
530 INPUT V
```

Footnotes

1. The "be-being" and "been-being" forms toyed with earlier pose euphonic problems for most speakers. But they sometimes do occur in spoken utterances, though very rarely. Most likely you've never read one before in print: they do require a courageous editor.
2. The University of Wisconsin Press, Madison and Milwaukee, 1964.
3. ABE's vocabulary has been stunted. Joos includes the additional modals must, ought to, dare and need. These, if ABE were to learn them, would extend her range from 159 to 223. Indeed, the quasi-auxiliaries be to, be going to, be about to, and have to might well be taught to ABE, with considerable patience of course.

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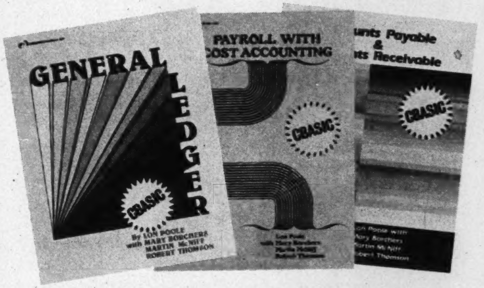

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CIRCLE 175 ON READER SERVICE CARD

1084

Construction, cont'd . . .

```
540 IF V<1 THEN 520
550 IF V>6 THEN 520
560 PRINT
570 PRINT "CHOOSE A NOUN (1-6)  ";
580 INPUT F
590 IF F<1 THEN 570
600 IF F>6 THEN 570
610 PRINT
620 PRINT "SHOULD '";F$(F);"' BE"
630 PRINT "  1 SINGULAR OR 2 PLURAL  ";
640 INPUT N
650 IF N<1 THEN 620
660 IF N>2 THEN 620
670 IF N=2 THEN 750
680 PRINT "SHOULD '";F$(F);"' BE"
690 PRINT "  1 FEMALE OR 2 MALE  ";
700 INPUT R
710 IF R<1 THEN 680
720 IF R>2 THEN 680
730 LET F1$=F$(F)
740 GO TO 770
750 LET F1$=F$(F)&"S"
760 LET R=3
770 PRINT
780 PRINT "WHO SHOULD OUR SENTENCE"
790 PRINT "  BE ABOUT?"
800 PRINT
810 FOR X=1 TO 3
820 PRINT X;G$(X+Z);TAB(15);X+3;G$(X+6)
830 NEXT X
840 PRINT
850 PRINT "CHOOSE A NUMBER (1-6)  ";
860 INPUT C
870 IF C<1 THEN 850
880 IF C>6 THEN 850
890 PRINT
900 PRINT "WHO IS TO BE THE GRAMMATICAL"
910 PRINT "SUBJECT OF THE SENTENCE?"
920 PRINT
930 PRINT "1 THE ";F1$
940 PRINT " OR 2 ";
950 IF C>3 THEN 980
960 PRINT G$(C+Z);" ";
970 GO TO 990
980 PRINT C$(C+6);" ";
990 INPUT S
1000 IF S<1 THEN 930
1010 IF S>2 THEN 930
1020 PRINT
1030 IF S=2 THEN 1110
1040 IF C>3 THEN 1070
1050 LET C1$=G$(C)&"'S "&F1$
1060 GO TO 1080
1070 LET C1$=C$(C+12)&" "&F1$
1080 LET C2$=C$(C+6)
1090 LET C3$=C$(R)
1100 GO TO 1170
1110 IF C>3 THEN 1140
1120 LET C1$=G$(C)
1130 GO TO 1150
1140 LET C1$=C$(C)
1150 LET C2$=C$(C+12)&" "&F1$
1160 LET C3$=C$(C)
1170 PRINT
1180 PRINT "CHOOSE ANY NUMBER 0-159  ";
1190 INPUT Y
1200 PRINT
```

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```
1210 IF Y<0 THEN 1180
1220 IF Y>159 THEN 1180
1230 GO SUB 2610
1240 IF S=1 THEN 1280
1250 IF C=6 THEN 1330
1260 IF C<3 THEN 1290
1270 GO TO 1310
1280 IF N=2 THEN 1310
1290 LET A=1
1300 GO TO 1340
1310 LET A=3
1320 GO TO 1340
1330 LET A=5
1340 LET A=A+D
1350 IF Y<2 THEN 1500
1360 IF Y=16 THEN 1500
1370 IF Y=17 THEN 1500
1380 IF M=0 THEN 1400
1390 LET M=M+D
1400 GO SUB 1630
1410 GO SUB 1680
1420 GO SUB 1760
1430 GO SUB 1830
1440 GO SUB 1890
1450 GO SUB 1950
1460 GO SUB 1990
1470 IF E=1 THEN 1570
1480 GO SUB 2130
1490 GO TO 1570
1500 IF Y=0 THEN 1560
1510 IF Y=16 THEN 1560
1520 GO SUB 1600
1530 GO SUB 2340
1540 GO SUB 2570
1550 GO TO 1570
1560 GO SUB 2450
1570 PRINT
1580 NEXT X
1590 STOP
1600 PRINT C1$
1610 PRINT TAB(2);
1620 RETURN
1630 IF M=0 THEN 1670
1640 PRINT B$(M);" ";
1650 GO SUB 1600
1660 LET J$=B$(M)
1670 RETURN
1680 IF H=0 THEN 1750
1690 IF M=0 THEN 1710
1700 LET A=3
1710 PRINT H$(A);" ";
1720 IF M>0 THEN 1750
1730 GO SUB 1600
1740 LET J$=H$(A)
1750 RETURN
1760 IF M=0 THEN 1820
1770 IF H=1 THEN 1820
1780 IF B=0 THEN 1800
1790 GO TO 1810
1800 IF G=0 THEN 1820
1810 PRINT "BE ";
1820 RETURN
1830 IF H=0 THEN 1880
1840 IF B=0 THEN 1860
1850 GO TO 1870
1860 IF G=0 THEN 1880
1870 PRINT "BEEN ";
1880 RETURN
1890 IF M>0 THEN 1940
1900 IF H=1 THEN 1940
1910 PRINT A$(A);" ";
1920 GO SUB 1600
1930 LET J$=A$(A)
1940 RETURN
1950 IF G=0 THEN 1980
1960 IF B=0 THEN 1980
1970 PRINT "BEING ";
1980 RETURN
1990 PRINT E$(V);
2000 IF B=1 THEN 2060
2010 IF G=1 THEN 2040
2020 IF H=1 THEN 2060
2030 GO TO 2070
2040 PRINT "ING";
2050 GO TO 2070
2060 PRINT "ED";
2070 PRINT
2080 PRINT TAB(2);
2090 IF B=0 THEN 2110
2100 PRINT "BY ";
2110 PRINT C2$;"?"
2120 RETURN
2130 IF C<4 THEN 2260
2140 IF C=5 THEN 2260
2150 IF S=1 THEN 2260
2160 IF C=4 THEN 2220
2170 LET C3$="YOU"
2180 IF M>0 THEN 2260
2190 IF H=1 THEN 2260
2200 LET J$=A$(A-2)
2210 GO TO 2260
2220 LET C3$="I"
2230 IF M>0 THEN 2260
2240 IF H=1 THEN 2260
2250 LET J$=A$(A+2)
2260 PRINT Y;">> YES, ";C3$;" ";J$;
2270 IF M=0 THEN 2320
2280 IF H=0 THEN 2320
2290 IF B=1 THEN 2310
2300 IF G=0 THEN 2320
2310 PRINT " HAVE";
2320 PRINT "."
2330 RETURN
2340 PRINT E$(V);
2350 IF D=1 THEN 2420
2360 IF S=1 THEN 2390
2370 IF C>2 THEN 2430
2380 GO TO 2400
2390 IF N=2 THEN 2430
2400 PRINT "S";
2410 GO TO 2430
2420 PRINT "ED";
2430 PRINT " ";C2$;"."
2440 RETURN
2450 PRINT D$(A);" ";C1$
2460 PRINT TAB(2);E$(V);" ";C2$;"?"
2470 IF S=1 THEN 2550
2480 IF C=4 THEN 2530
2490 IF C<6 THEN 2550
2500 LET C3$="YOU"
2510 LET A=A-2
2520 GO TO 2550
2530 LET C3$="I"
2540 LET A=A+2
2550 PRINT Y;">> YES, ";C3$;" ";D$(A);"."
2560 RETURN
2570 PRINT "   A SECOND FORM IS:"
2580 GO SUB 1600
2590 PRINT D$(A);" ";E$(V);" ";C2$;"."
2600 RETURN
2610 LET W=128
2620 LET M=0
2630 LET Q=16
2640 LET U=Y
2650 IF Y<32 THEN 2730
2660 FOR P=7 TO 1 STEP -2
2670 IF U<W THEN 2710
2680 LET M=P
2690 LET U=U-W
2700 GO TO 2730
2710 LET W=W-32
2720 NEXT P
2730 FOR P=5 TO 1 STEP -1
2740 IF U<Q THEN 2780
2750 LET L(6-P)=1
2760 LET U=U-Q
2770 GO TO 2790
2780 LET L(6-P)=0
2790 LET Q=Q/2
2800 NEXT P
2810 LET D=L(1)
2820 LET H=L(2)
2830 LET G=L(3)
2840 LET B=L(4)
2850 LET E=L(5)
2860 RETURN
2870 DATA IS,DOES,AID,FRIEND,HAS
2880 DATA WAS,DID,ANGER,CLASSMATE
2890 DATA HAD,ARE,DO,AVOID,VISITOR
2900 DATA HAVE,WERE,DID,QUESTION
2910 DATA HALL GUARD,HAD,AM,DO
2920 DATA HELP,TEACHER,HAVE,WAS
2930 DATA DID,ANSWER,LIBRARIAN
2940 DATA HAD,WILL,WOULD,SHALL
2950 DATA SHOULD,CAN,COULD,MAY
2960 DATA MIGHT,SUE,JOE,SUE AND JOE
2970 DATA ANN,SAM,ANN AND SAM,YOU
2980 DATA YOU AND ME,ME,SHE,HE
2990 DATA THEY,YOU,WE,I,HER,HIM
3000 DATA THEM,YOU,US,ME,HER,HIS
3010 DATA THEIR,YOUR,OUR,MY
3020 END
```

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The Standard In Information Management Systems

CIRCLE 159 ON READER SERVICE CARD

Reading Level Difficulty

Ronald Carlson

There are several formulas, such as Fog Index or Flesch Scale, used to estimate the reading level of text books. Most of these formulas count the number of words, syllables, sentences and polysyllabic words. Other formulas tally the occurrences of certain key words from a specific list of words.

If you have a large quantity of samples to determine the reading level or if you need to find the reading level only on occasion, this program will calculate the approximate grade level of the material.

The Fog Index, developed by Robert Gunning, is based on the following formula:

Grade Level = .4 *(W + L)

W = number of words with 3 or more syllables
L = average sentence length

There are exceptions involving words that end with -ing or -ed or capitalized words.

In my BASIC program there is a slight variation from the original formulas, inasmuch as counting syllables is a formidable task. I've used an approximation, that any word that is nine letters or longer will be three or more syllables. I also count the number of words with three or more distinct vowels and average it with the approximation by length.

So far in all of the samples I've tested, this estimation is within .5 of the grade level stated for the material. It is suggested that you take several passages, about 100 words long, throughout the book to receive an accurate measure of the grade level of that book.

Ronald Carlson, 44825 Kirk Ct., Canton, MI 48187

```
10REM
20REM READING LEVEL DIFFICULTY
30REM R. CARLSON
40REM CANTON, MICH.
50REM
60DIM A$(100)
70R1=0
80N=0
90D=0
100PRINT "DIRECTIONS"
110PRINT
120PRINT"PLEASE DELETE ALL PUNCTUATION EXCEPT AT THE END OF A SENTENCE ."
130PRINT"PLEASE TYPE A SPACE BEFORE THIS PUNCTUATION .THE ACCURACY"
140PRINT"WILL BE INCREASED IF YOU CHOOSE SEVERAL PASSAGES THROUGHOUT"
150PRINT"THE BOOK ."
160PRINT
170INPUT "HOW MANY LINES OF TEXT ",A
180PRINT"TYPE IN THE PASSAGE,ONE LINE AT A TIME."
190PRINT
200S=0
210W=0
220L=0
230T=0
240T1=0
250V=0
260FOR B=1 TO A
270INPUT A$
280X=LEN(A$)
290IF A$(X,X)="." THEN 420
300IF A$(X,X)="!" THEN 420
310IF A$(X,X)="?" THEN 420
320A$=A$+" "
330REM T IS NUMBER OF 3 SYLLABLE WORDS
340REM T1 IS THE NUMBER OF THREE SYLLABLE WORDS USING VOWELS
350REM L IS THE NUMBER OF LETTERS IN A WORD
360REM S IS THE NUMBER OF SENTENCES
370REM W IS THE NUMBER OF WORDS
380REM V IS THE NUMBER OF VOWELS /WORD
390REM D IS AN INDICATOR FOR DIPTHONGS
400REM N IS THE NUMBER OF SAMPLES
410REM R1 IS THE RUNNING TOTAL OF THE READING LEVELS
420FOR C=1TO LEN(A$)
430T$=A$(C,C)
440 IF T$="." THEN 600
450 IF T$="!" THEN 600
460 IF T$="?" THEN 600
470IF T$=" " THEN 620
480REM TRIPPING THE VARIOUS COUNTERS
490L=L+1
500IF T$="A" THEN 570
510IF T$="E" THEN 570
520IF T$="I" THEN 570
530IF T$="O" THEN 570
540IF T$="U" THEN 570
550D=0
560GOTO 680
570 D=D+1
580IF D=1 THEN V=V+1
590GOTO680
600S=S+1
610GOTO680
620W=W+1
630D=0
640IF L>=9 THEN T=T+1
650L=0
660IF V>=3 THEN T1=T1+1
670V=0
680NEXT C
690NEXT B
700T=INT((T+T1)/2)
710R=.4*(T+W/S)
720PRINT
730PRINT"THE READING LEVEL FOR THIS PASSAGE IS APPROXIMATELY ";R
740PRINT T;" THREE SYLLABLE WORDS"
750PRINT W;" WORDS IN THIS PASSAGE"
760PRINT S;" SENTENCES"
770INPUT"DO YOU HAVE MORE MATERIAL ? ",A$
```

Reading, cont'd...

```
780N=N+1
790R1=R1+R
800IF A$="YES" THEN 170
810PRINT
820PRINT"THE OVERALL READING LEVEL IS GRADE ";R1/N
830END
READY



RUN

DIRECTIONS

PLEASE DELETE ALL PUNCTUATION EXCEPT AT THE END OF A SENTENCE .
PLEASE TYPE A SPACE BEFORE THIS PUNCTUATION .THE ACCURACY
WILL BE INCREASED IF YOU CHOOSE SEVERAL PASSAGES THROUGHOUT
THE BOOK .

HOW MANY LINES OF TEXT 10
TYPE IN THE PASSAGE,ONE LINE AT A TIME.

?WE FEEL THIS IS MUCH TOO LITTLE COMING MUCH TOO
?LATE .IN THAT SENSE WE FEEL HIS PROGRAM IS NOT SUFFICIENTLY
?STRONG ENOUGH .WE FEEL HE SHOULD PROPOSE TO CUT DOWN
?BY AT LEAST 10 PERCENT IN TWO MONTHS RATHER THAN 50
?PERCENT IN 10 YEARS .NOW HE CAN CUT THE DEMAND BY 10
?PERCENT IN TWO MONTHS WE FEEL WITH A PROGRAM OF EDUCATING
?AMERICANS .WE CALL ON HIM TO ALLOCATE $100 MILLION
?FROM THE DEPARTMENT OF ENERGY TO EDUCATE THE AMERICAN
?PEOPLE HOW TO CONSERVE ENERGY HOW NOT TO USE
?THEIR CARS TAKE ONE MINUTE HOT SHOWERS .

THE READING LEVEL FOR THIS PASSAGE IS APPROXIMATELY  10.72
 7 THREE SYLLABLE WORDS
 99 WORDS IN THIS PASSAGE
 5 SENTENCES
DO YOU HAVE MORE MATERIAL ? NO

THE OVERALL READING LEVEL IS GRADE  10.72
READY
```

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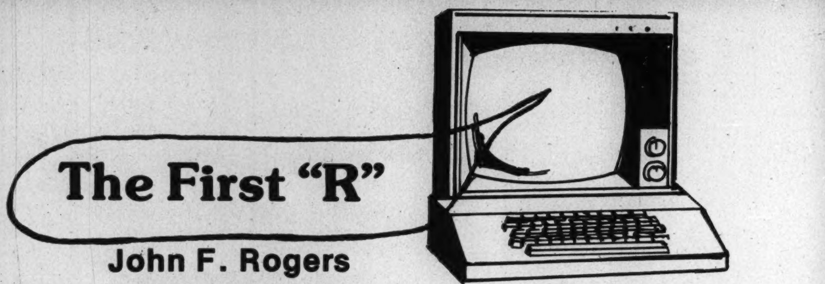

The First "R"

John F. Rogers

Reading Practice with the TRS-80 Voice Synthesizer

"Reading, Riting, and Rithmetic" — the "Three R's." Without the first "R," a person can have much difficulty in this Age of Information. If a child is having reading troubles, perhaps a little extra drill would be appropriate. The program "Reading Practice with the TRS-80 Voice Synthesizer" may be suitable for such extra drill.

The Radio Shack TRS-80 Voice Synthesizer gives your microcomputer the ability to speak. (See "Phonetically Speaking," June 1979, *Creative Computing.)* This program utilizes that ability to give a student drill in reading and saying the basic words that should be known at a given age.

The Dolch Basic Sight Word List contains 212 words that the average third grade child should recognize. (You should be able to get a copy of the Dolch List from your nearby primary school.) By listing those words which comprise 50% to 75% of all reading matter in a DATA statement along with their Voice Synthesizer phonetic spellings, you can give a student drill in retaining those words in his reading and speaking vocabularies.

Program REMarks

The program is written in Radio Shack Level II Basic, but it can be adapted to Level I or to other Basics.

Lines 20-100 give the student instructions in how the drill will proceed. Both written and spoken instructions are given throughout the program.

Lines 110-155 present the words that are to be spoken by the student. Subroutine 500 actually writes the word on the screen and gives the correct pronunciation. For emphasis, the word blinks inside a graphics rectangle.

In lines 170-200, the computer asks the student to repeat the word once more along with the computer.

Subroutine 400 outlines the screen — a "dress-up" to set off the written instructions.

Subroutines 1000 and 1100 send the phonetic spellings of words to be spoken to the Voice Synthesizer.

Subroutine 2000 is used by the programmer to check the pronunciations of words to be listed in the DATA statements to ensure clarity and correctness. (Just enter RUN 2000.)

Lines 300 and following contains the DATA statement listings of the words to be read and spoken. The numbers are important for correct execution of the program. □

John F. Rogers, 600 Seventh St., Morgan City, LA 70380.

```
1 REM ***        READING PRACTICE        ***
2 REM ***         WITH THE TRS-80        ***
3 REM ***       VOICE SYNTHESIZER        ***
4 REM ***          PROGRAM BY            ***
5 REM ***       JOHN F.  ROGERS          ***
6 REM ***       600 SEVENTH ST.          ***
7 REM ***       MORGAN CITY,             ***
8 REM ***       LOUISIANA 70380          ***
9 REM ***                                ***
10 CLS:GOSUB 400
20 PRINT@150,"H E L L O -";:VO$="H38L8[U":GOSUB 1000:FOR K=0 TO 600:NEXT
30 PRINT@270,"TODAY YOU WILL PRACTICE";:VO$="T<UD@*&Y'UW!ILLPR99KT!IS":GOSUB 1000
35 FOR K=0 TO 960:NEXT
40 PRINT@404,"SAYING WORDS I SHOW YOU. ";:VO$="S@@&E+W/RDZ;5#&>>OOWY'U":GOSUB 1000
50 FOR I=0 TO 1500:NEXT
60 CLS:GOSUB 400
70 PRINT@140,"I WILL FLASH A WORD ON THE SCREEN,";
75 VO$=";5#&W!ILLFL79>>66W/RD":GOSUB 1000:FOR K=0 TO 800:NEXT
80 VO$=";ANN<67SKR.ENN":GOSUB 1000:FOR K=0 TO 600:NEXT
85 PRINT@280,"THEN YOU WILL SAY IT. ";:VO$="<<35NY'UW!ILLS@@&!IT":GOSUB 1000:FOR K=0 TO 1200:NEXT
90 PRINT@404,"THEN  I  WILL SAY THE WORD. ";:VO$="<<35N0;5#& W!ILLS@@&<67W/RD":GOSUB 1000
95 FOR K=0 TO 1400:NEXT:PRINT@520,"FINALLY, WE'LL SAY THE WORD TOGETHER. ";
100 VO$="F;#&N8LE& W.&8LS@@&<67W/RD":GOSUB 1000:FOR K=0 TO 1040:NEXT:VO$="T<UG35<</R":GOSUB 1000
105 FOR K=0 TO 1500:NEXT
110 CLS:GOSUB 400:PRINT@217,"R E A D Y ?";:VO$="R345DE&":GOSUB 1000:FOR K=0 TO 1000:NEXT
120 CLS:GOSUB 400
130 PRINT@140,"THE FIRST WORD IS... ";:VO$="<.F/RSTW/RD!IZZ":GOSUB 1000:FOR K=0 TO 600:NEXT
135 READ Z,S$,WD$:GOSUB 500:GOTO 160
140 CLS:GOSUB 400:ON ERROR GOTO 900:READ Z
150 PRINT@140,"THE NEXT WORD IS... ";:VO$="<.N35KSTW/RD!IZZ":GOSUB 1000
155 READ S$,WD$:GOSUB 500
160 CLS:GOSUB 400
170 PRINT@140,"DID YOU SAY THE WORD CORRECTLY?";
175 VO$="D!IDDY'US@@&<67W/RDKOR45KTLE&":GOSUB 1000:FOR K=0 TO 1200:NEXT
180 PRINT@265,"LET'S SAY IT TOGETHER:";:VO$="L35TS0S@@&!IT0T<UG35<</R":GOSUB 1000
185 FOR K=0 TO 1000:NEXT
190 PRINT@404,"R E A D Y ?";:VO$="R345DE&":GOSUB 1000:FOR K=0 TO 600:NEXT
200 PRINT@530,"THE WORD IS:  ";S$;:VO$="<67W//RD!IZZ":GOSUB 1000:GOSUB 1100
210 FOR I=0 TO 1800:NEXT:GOTO 140
300 DATA 1,CLEAN,KLL.ENN,2,HURT,HH//RT,3,GREEN,GRR.ENN,4,LAUGH,LL99FF
400 FOR I=0 TO 62 STEP 2:PRINT@I,"#";:NEXT
405 FOR I=64 TO 832 STEP 64:PRINT@I,"#";:PRINT@I+62,"#";:NEXT
410 FOR I=896 TO 958 STEP 2:PRINT@I,"#";:NEXT
420 RETURN
500 FOR J=35 TO 94:SET(J,11):SET(J,22):NEXT
505 FOR J=11 TO 22:SET(35,J):SET(94,J):NEXT
510 FOR I=0 TO 7:PRINT@348," ";:FOR J=0 TO 100:NEXT J:PRINT@348,S$;:FOR J=0 TO 600:NEXT .
520 PRINT@590,"THE WORD IS PRONOUNCED... ";:VO$="<67W/RD!IZZPRON;UNST":GOSUB 1000
525 GOSUB 1100:FOR I=0 TO 1600:NEXT:GOSUB 1100:FOR J=0 TO 1500:NEXT
530 RETURN
900 CLS:GOSUB 400
910 PRINT@130,"THE WORD LIST HAS ENDED. ";:VO$="<77W/RDL!IST0H99Z035ND4D":GOSUB 1000
915 FOR K=0 TO 1000:NEXT
920 PRINT@260,"PLEASE CALL THE INSTRUCTOR. ";:VO$="PL.EZK122LL0<.INSTR67KT/":GOSUB 1000
930 RESUME 950
950 FOR I=0 TO 1500:NEXT
960 PRINT@390,"THE DATA LIST OF WORDS";:PRINT@479,"HAS BEEN DEPLETED. ";
970 PRINT@576,"PRESS 'BREAK' KEY TO GET CONTROL OF THE COMPUTER:";:GOTO 970
1000 POKE 16383,63:POKE 16383,32
1010 FOR VX=1 TO LEN(VO$)
1020 POKE 16383,ASC(MID$(VO$,VX,1))
1030 NEXT VX
1040 POKE 16383,32:POKE 16383,63:POKE 16383,32
1050 RETURN
1100 POKE 16383,63:POKE 16383,32
1110 FOR VX=1 TO LEN(WD$)
1120 POKE 16383,ASC(MID$(WD$,VX,1))
1130 NEXT VX
1140 POKE 16383,32:POKE 16383,63:POKE 16383,32
1150 RETURN
2000 CLS
2010 PRINT@0,"THIS IS THE PRONUNCIATION TESTING ROUTINE:";
2020 PRINT@128,VO$
2030 PRINT@192,"ENTER PHONEMES... "
2040 INPUT VO$:GOSUB 1000
2050 GOTO 2000
```

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CIRCLE 142 ON READER SERVICE CARD

An educational aid for language teaching and learning.

Apple
Pomme

The Word Board

Howard Berenbon

Are you looking for a practical application for your home computer? Are you interested in educational applications or experimenting with new devices that can aid the handicapped? Then the "Word Board" is just the program for you. Using a TRS-80 Level II, Apple or Pet microcomputer, you can turn your system into a language communicator.

Program 1

The "Word Board" accepts keyboard entry of individual letters and displays single words assigned to each letter. Its use is unlimited in educational applications.

The "Word Board" may be used to aid in language instruction by assigning English words to each of the 26 keys, for letters A through Z. For each English word covering a key, its French, German, Italian or Spanish equivalent can be displayed. Program 1 allows the French word to be displayed when the English word is depressed. The words are printed towards the center of the video display after the enter key is depressed. It's a handy aid for language students to help in memorizing foreign vocabulary words. After the 26 words are learned, the student can test his memory by covering the keytops and typing through the list to review the vocabulary. (Figure 1a is a sample RUN of Program 1 and Figure 1b is a list of the French words used.)

A variation of this "Word Board" is to place small pictures on the keytops and have the pictures access their foreign meanings. Program lines 600 through 1630 hold the French words in "PRINT" statements. An additional 10 keys, 1 through 0, are used to access their equivalent numbers in French. The " " sign is used to skip 8 lines, with lines 1640 to 1670. The words may be changed for different vocabulary sets and different languages.

Howard Berenbon, 2681 Peterboro, W. Bloomfield, MI 48033.

```
WORD BOARD: VOCABULARY-ENGLISH TO FRENCH

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ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS
WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS
ENTERING AN '@' WILL SKIP 8 LINES
MAY BE USED AS A LANGUAGE INSTRUCTION AID


ENGLISH          FRENCH
-------          ------

SPOON            CUILLERE


ENGLISH          FRENCH
-------          ------

APPLE            POMME


ENGLISH          FRENCH
-------          ------

HAT              CHAPEAU



ENGLISH          FRENCH
-------          ------

FISH             POISSEN
```

Figure 1a

NOUS AVONS CHANGÉ TOUT CELA. . .
LASCIATE OGNI SPERANZA, VOI CH'ENTRATE.

Key	English Word	French Word
A	Apple	Pomme
B	Airplane	Avion
C	Cup	Tasse
D	Cow	Vache
E	Coat	Veston
F	Dog	Chien
G	Hand	Main
H	Sun	Soleil
I	Book	Livre
J	Moon	Lune
K	Ear	Oreille
L	Cloud	Nuage
M	Comb	Peigne
N	Eyes	Yeux
O	Ice	Glace
P	Star	Etoile
Q	Spoon	Cuillere
R	Chair	Chaise
S	Horse	Cheval
T	Pencil	Crayon
U	Lamp	Lampe
V	Bird	Oiseau
W	Fish	Poissen
X	Bicycle	Velo
Y	Cat	Chat
Z	Hat	Chapeau
1	One	Un
2	Two	Deux
3	Three	Trois
4	Four	Quatre
5	Five	Cinq
6	Six	Six
7	Seven	Sept
8	Eight	Huit
9	Nine	Neuf
0	Zero	Zero
a	(skip 8 lines)	

Figure 1b—French Vocabulary Words

Program 2

The second program uses the "Word Board" as a language communicator for the handicapped. A speech handicapped person may communicate using this program. A very limited vocabulary of 26 essential words (see Figure 2) and numbers 1 through 0 are assigned to the keys.

You may also place the foreign meanings of the words on the keytops and have their English equivalents displayed when each key is depressed. Have the student read the word on the keytop and recite the English meaning, then depress the key to find the correct meaning.

The program can be used as a computer dictionary. The meaning of words, assigned to each key, may be stored in sentence form at lines 600 through 1630. Each time a key is depressed, the meaning of the word assigned to the key is displayed.

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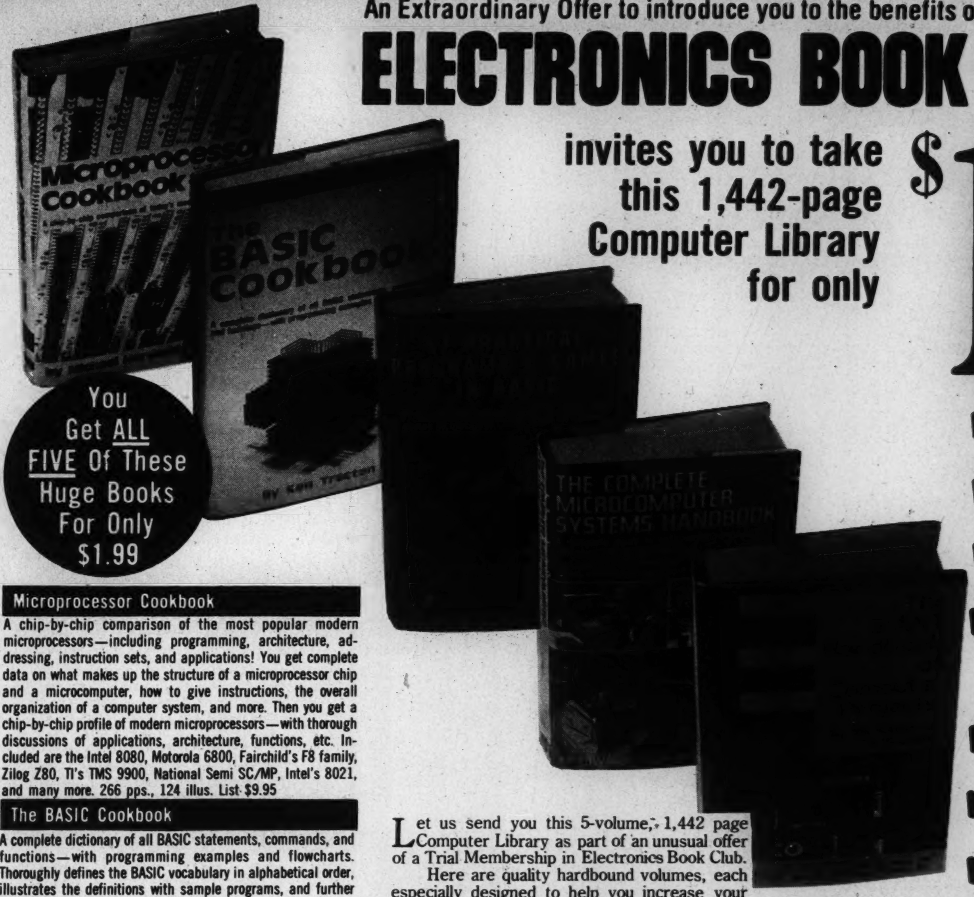

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Word Board, cont'd...

Program 1

```
0010 PRINT "WORD BOARD: VOCABULARY-ENGLISH TO FRENCH"
0020 PRINT
0030 PRINT "COPYRIGHT (C) 1979 BY HOWARD BERENBON"
0040 PRINT
0050 PRINT "ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS"
0060 PRINT "WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS"
0065 PRINT "ENTERING AN '@' WILL SKIP 8 LINES"
0070 PRINT "MAY BE USED AS A LANGUAGE INSTRUCTION AID"
0100 INPUT A$
0105 PRINT
0110 IF A$="A" THEN 600
0120 IF A$="B" THEN 640
0130 IF A$="C" THEN 670
0140 IF A$="D" THEN 700
0150 IF A$="E" THEN 730
0160 IF A$="F" THEN 760
0170 IF A$="G" THEN 790
0180 IF A$="H" THEN 810
0190 IF A$="I" THEN 840
0200 IF A$="J" THEN 870
0210 IF A$="K" THEN 910
0220 IF A$="L" THEN 940
0230 IF A$="M" THEN 970
0240 IF A$="N" THEN 1010
0250 IF A$="O" THEN 1040
0260 IF A$="P" THEN 1070
0270 IF A$="Q" THEN 1110
0280 IF A$="R" THEN 1140
0290 IF A$="S" THEN 1170
0300 IF A$="T" THEN 1210
0310 IF A$="U" THEN 1240
0320 IF A$="V" THEN 1270
0330 IF A$="W" THEN 1310
0340 IF A$="X" THEN 1340
0350 IF A$="Y" THEN 1370
0360 IF A$="Z" THEN 1410
0370 IF A$="1" THEN 1440
0380 IF A$="2" THEN 1460
0390 IF A$="3" THEN 1480
0400 IF A$="4" THEN 1500
0410 IF A$="5" THEN 1520
0420 IF A$="6" THEN 1540
0430 IF A$="7" THEN 1560
0440 IF A$="8" THEN 1580
0450 IF A$="9" THEN 1600
0460 IF A$="0" THEN 1620
0470 IF A$="@" THEN 1640
0480 GOTO 100
0600 GOSUB 1700
0610 PRINT "APPLE";TAB(20);"POMME"
0630 GOTO 100
0640 GOSUB 1700
0650 PRINT "AIRPLANE";TAB(20);"AVION"
0660 GOTO 100
0670 GOSUB 1700
0680 PRINT "CUP";TAB(20);"TASSE"
0690 GOTO 100
0700 GOSUB 1700
0710 PRINT "COW";TAB(20);"VACHE"
0720 GOTO 100
0730 GOSUB 1700
0740 PRINT "COAT";TAB(20);"VESTON"
0750 GOTO 100
0760 GOSUB 1700
0770 PRINT "DOG";TAB(20);"CHIEN"
0780 GOTO 100
0790 GOSUB 1700
0800 PRINT "HAND";TAB(20);"MAIN"
0805 GOTO 100
0810 GOSUB 1700
0820 PRINT "SUN";TAB(20);"SOLEIL"
0830 GOTO 100
0840 GOSUB 1700
0850 PRINT "BOOK";TAB(20);"LIVRE"
0860 GOTO 100
0870 GOSUB 1700
0880 PRINT "MOON";TAB(20);"LUNE"
0890 GOTO 100
0910 GOSUB 1700
0920 PRINT "EAR";TAB(20);"OREILLE"
0930 GOTO 100
0940 GOSUB 1700
0950 PRINT "CLOUD";TAB(20);"NUAGE"
0960 GOTO 100
0970 GOSUB 1700
0980 PRINT "COMB";TAB(20);"PEIGNE"
0990 GOTO 100
1010 GOSUB 1700
1020 PRINT "EYES";TAB(20);"YEUX"
1030 GOTO 100
1040 GOSUB 1700
1050 PRINT "ICE";TAB(20);"GLACE"
1060 GOTO 100
1070 GOSUB 1700
1080 PRINT "STAR";TAB(20);"ETOILE"
1090 GOTO 100
1110 GOSUB 1700
1120 PRINT "SPOON";TAB(20);"CUILLERE"
1130 GOTO 100
1140 GOSUB 1700
1150 PRINT "CHAIR";TAB(20);"CHAISE"
1160 GOTO 100
1170 GOSUB 1700
1180 PRINT "HORSE";TAB(20);"CHEVAL"
1190 GOTO 100
1210 GOSUB 1700
1220 PRINT "PENCIL";TAB(20);"CRAYON"
1230 GOTO 100
1240 GOSUB 1700
1250 PRINT "LAMP";TAB(20);"LAMPE"
1260 GOTO 100
1270 GOSUB 1700
1280 PRINT "BIRD";TAB(20);"OISEAU"
1290 GOTO 100
1310 GOSUB 1700
1320 PRINT "FISH";TAB(20);"POISSEN"
1330 GOTO 100
1340 GOSUB 1700
1350 PRINT "BICYCLE";TAB(20);"VELO"
1360 GOTO 100
1370 GOSUB 1700
1380 PRINT "CAT";TAB(20);"CHAT"
1390 GOTO 100
1410 GOSUB 1700
1420 PRINT "HAT";TAB(20);"CHAPEAU"
1430 GOTO 100
1440 GOSUB 1700
1445 PRINT "ONE";TAB(20);"UN"
1450 GOTO 100
1460 GOSUB 1700
1465 PRINT "TWO";TAB(20);"DEUX"
1470 GOTO 100
1480 GOSUB 1700
1485 PRINT "THREE";TAB(20);"TROIS"
1490 GOTO 100
1500 GOSUB 1700
1505 PRINT "FOUR";TAB(20);"QUATRE"
1510 GOTO 100
1520 GOSUB 1700
1525 PRINT "FIVE";TAB(20);"CINQ"
1530 GOTO 100
1540 GOSUB 1700
1545 PRINT "SIX";TAB(20);"SIX"
1550 GOTO 100
1560 GOSUB 1700
1565 PRINT "SEVEN";TAB(20);"SEPT"
1570 GOTO 100
1580 GOSUB 1700
1585 PRINT "EIGHT";TAB(20);"HUIT"
1590 GOTO 100
1600 GOSUB 1700
1605 PRINT "NINE";TAB(20);"NEUF"
1610 GOTO 100
1620 GOSUB 1700
1625 PRINT "ZERO";TAB(20);"ZERO"
1630 GOTO 100
1640 FOR I=1 TO 8
1650 PRINT
1660 NEXT I
1670 GOTO 100
1700 PRINT "ENGLISH";TAB(20);"FRENCH"
1710 PRINT "-------";TAB(20);"------"
1720 PRINT
1740 RETURN
```

1 = 12 = 23 = 34 = 45 = 56 = 67 = 78 = 89 = 90 = 0
Q = I W = it E = is R = do T = go Y = sleep
U = here I = please O = yes P = no
A = he S = you D = are F = want G = drink
H = speak J = happy K = thank you L = okay
a = (skip 8 lines) Z = she X = am C = like
V = to B = eat N = time M = not

Figure 2. A Limited Vocabulary of 26 Essential Words and 10 Numbers

The speech impaired individual may use this "Word Board" to "talk" to others with the aid of the computer. Only two movements are required to use the "Word Board" - typing the word and typing enter to display the word. Sentences may be formed calling for the persons basic needs, such as eating and sleeping. Alternately, sentences may replace the words for more clearly describing the individuals wants and needs. Then depressing a certain key can display a whole sentence, such as "I am hungry, when do we eat?" Of course, the sentence won't fit on the keytop, so the handicapped person will have to choose from a list of letters with assigned sentences.

The home computer system may be less expensive than other devices that are used to aid the handicapped.

Regardless of the "Word Board" version you use, you can see that your home computer may be more useful than you ever imagined. Expand on program 1 for your educational needs. Develop a more detailed language instruction program, with several lists of vocabulary. Use it to increase your English vocabulary by accessing and learn the meanings of 10 new words a week. The microcomputer is a great learning tool, but you have to write the programs to utilize your system.

You may or may not have an application for program 2. But you might want to find organizations in your area that help the handicapped. Show them the "Word Board." They may not know that a home computer system can aid the handicapped, and your application may be useful to them. The home computer system may be less expensive than other devices that are used to aid the handicapped, and you would be doing a service to the community by demonstrating your system. Direct them to your local area computer store and suggest a system. ☐

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CIRCLE 124 ON READER SERVICE CARD

Word Board, cont'd...

Figure 2a

```
WORD BOARD

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ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS
WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS
ENTERING AN '@' WILL SKIP 8 LINES
MAY BE USED AS A HELP TO THE HANDICAPPED

                    I
                    WANT
                    TO
                    EAT

                    THANK YOU

                    IS
                    IT
                    TIME
                    TO
                    GO
```

Program 2

```
0010 PRINT "WORD BOARD"
0020 PRINT
0030 PRINT "COPYRIGHT (C) 1979 BY HOWARD BERENBON"
0040 PRINT
0050 PRINT "ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS"
0060 PRINT "WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS"
0065 PRINT "ENTERING AN '@' WILL SKIP 8 LINES"
0070 PRINT "MAY BE USED AS A HELP TO THE HANDICAPPED"
0100 INPUT A$
0110 IF A$="A" THEN 600
0120 IF A$="B" THEN 640
0130 IF A$="C" THEN 670
0140 IF A$="D" THEN 700
0150 IF A$="E" THEN 730
0160 IF A$="F" THEN 760
0170 IF A$="G" THEN 790
0180 IF A$="H" THEN 810
0190 IF A$="I" THEN 840
0200 IF A$="J" THEN 870
0210 IF A$="K" THEN 910
0220 IF A$="L" THEN 940
0230 IF A$="M" THEN 970
0240 IF A$="N" THEN 1010
0250 IF A$="O" THEN 1040
0260 IF A$="P" THEN 1070
0270 IF A$="Q" THEN 1110
0280 IF A$="R" THEN 1140
0290 IF A$="S" THEN 1170
0300 IF A$="T" THEN 1210
0310 IF A$="U" THEN 1240
0320 IF A$="V" THEN 1270
0330 IF A$="W" THEN 1310
0340 IF A$="X" THEN 1340
0350 IF A$="Y" THEN 1370
0360 IF A$="Z" THEN 1410
0370 IF A$="1" THEN 1440
0380 IF A$="2" THEN 1460
0390 IF A$="3" THEN 1480
0400 IF A$="4" THEN 1500
0410 IF A$="5" THEN 1520
0420 IF A$="6" THEN 1540
0430 IF A$="7" THEN 1560
0440 IF A$="8" THEN 1580
0450 IF A$="9" THEN 1600
0460 IF A$="0" THEN 1620
0470 IF A$="@" THEN 1640
0480 GOTO 100
0600 PRINT TAB(20);"HE"
0610 GOTO 100
0640 PRINT TAB(20);"EAT"
0650 GOTO 100
0670 PRINT TAB(20);"LIKE"
0680 GOTO 100
0700 PRINT TAB(20);"ARE"
0710 GOTO 100
0730 PRINT TAB(20);"IS"
0740 GOTO 100
0760 PRINT TAB(20);"WANT"
0770 GOTO 100
0790 PRINT TAB(20);"DRINK"
0800 GOTO 100
0810 PRINT TAB(20);"SPEAK"
0820 GOTO 100
0840 PRINT TAB(20);"PLEASE"
0850 GOTO 100
0870 PRINT TAB(20);"HAPPY"
0880 GOTO 100
0910 PRINT TAB(20);"THANK YOU"
0920 GOTO 100
0940 PRINT TAB(20);"OKAY"
0950 GOTO 100
0970 PRINT TAB(20);"NOT"
0980 GOTO 100
1010 PRINT TAB(20);"TIME"
1020 GOTO 100
1040 PRINT TAB(20);"YES"
1050 GOTO 100
1070 PRINT TAB(20);"NO"
1080 GOTO 100
1110 PRINT TAB(20);"I"
1120 GOTO 100
1140 PRINT TAB(20);"DO"
1150 GOTO 100
1170 PRINT TAB(20);"YOU"
1180 GOTO 100
1210 PRINT TAB(20);"GO"
1220 GOTO 100
1240 PRINT TAB(20);"HERE"
1250 GOTO 100
1270 PRINT TAB(20);"TO"
1280 GOTO 100
1310 PRINT TAB(20);"IT"
1320 GOTO 100
1340 PRINT TAB(20);"AM"
1350 GOTO 100
1370 PRINT TAB(20);"SLEEP"
1380 GOTO 100
1410 PRINT TAB(20);"SHE"
1420 GOTO 100
1440 PRINT TAB(20);"1"
1450 GOTO 100
1460 PRINT TAB(20);"2"
1470 GOTO 100
1480 PRINT TAB(20);"3"
1490 GOTO 100
1500 PRINT TAB(20);"4"
1510 GOTO 100
1520 PRINT TAB(20);"5"
1530 GOTO 100
1540 PRINT TAB(20);"6"
1550 GOTO 100
1560 PRINT TAB(20);"7"
1570 GOTO 100
1580 PRINT TAB(20);"8"
1590 GOTO 100
1600 PRINT TAB(20);"9"
1610 GOTO 100
1620 PRINT TAB(20);"0"
1630 GOTO 100
1640 FOR I=1 TO 8
1650 PRINT
1660 NEXT I
1670 GOTO 100
```

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LEVEL II

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16K
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LEVEL II

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Another new game from Creative Computing ....

PERQUACKEY

David E. Powers

Perquackey is a word game written in TRS-80 Disk BASIC for a 32K machine. The object of the game is to form as many words as possible from a set of random letters. Scoring depends on the number of letters in the words you form and several other factors which add an extra element of strategy to the game. See the instructions in the program for more details.

Before running the program, you should turn on the display of the realtime clock with the CLOCK command in DOS. Note that the sample runs were done on a Radio Shack line printer using NEWDOS to print the screen display. □

Rabbi David E. Powers, 10 Wilber Ct., New Hyde Park, NY 11040.

```
IS THE CLOCK DISPLAYED? YES_                          00:06:47



                                                      00:07:22

              P E R Q U A C K E Y

   D O   Y O U   N E E D   I N S T R U C T I O N S ?

Y E S _
                              PERQUACKEY              00:07:52

"PERQUACKEY" IS THE DIFFERENT WORD GAME, FUN FOR ALL,
ESPECIALLY THOSE WHO LOVE TO HUNT FOR WORDS AND MEET THE
CHALLENGE OF AN EVER-TICKING CLOCK.

THIS VERSION OF "PERQUACKEY" MAY BE PLAYED BY UP TO
FOUR PLAYERS. YOU CAN EVEN PLAY IT SOLITAIRE, ALWAYS TRYING TO
BETTER YOUR SCORE FROM PREVIOUS GAMES AND ROUNDS. THE COMPUTER
WILL SET UP YOUR GAMES, TALLY YOUR SCORES, AND EVEN
MAKE SURE THAT YOU ARE PLAYING FAIRLY.


TO CONTINUE, PRESS ANY KEY.

                                                      00:08:22

THE OBJECT OF THE GAME IS TO FIND AND SPELL AS MANY WORDS AS
POSSIBLE FROM A LIST OF LETTERS THE COMPUTER WILL GENERATE FOR
YOU, ALL IN A THREE-MINUTE TIME LIMIT. AT FIRST, THE COMPUTER
WILL GIVE YOU TEN LETTERS WITH WHICH TO WORK. AS YOUR SCORE
INCREASES AND YOU BECOME "VULNERABLE" YOU WILL BE ALLOTTED
THIRTEEN LETTERS.  BUT YOU WILL HAVE TO ACHIEVE BETTER SCORES
OR BE SET POINTS FOR NON-SUPERIOR PLAY!
```

```
TO CONTINUE, PRESS ANY KEY.

                                                      00:08.53
THE COMPUTER WILL PROMPT YOU AS YOU GO, IN CASE YOU SHOULD NEED
ANY HELP IN THE MECHANICS OF THE GAME. BUT FOR YOUR INFORMATION
YOU SHOULD KNOW IN ADVANCE THAT ONLY WORDS IN A STANDARD
DICTIONARY ARE ACCEPTABLE. ALL THE PLAYERS SHOULD AGREE
ON ONE BEFORE PLAY IS BEGUN. OF COURSE, LIKE MOST WORD GAMES,
PROPER NAMES, FOREIGN WORDS, ABBREVIATIONS OR CAPITALIZED WORDS
ARE NOT ALLOWED. ALSO, YOU MUST RESIST THE TEMPTATION TO USE
PUNCTUATION MARKS. THE COMPUTER WILL NOT ALLOW THEM. THEY ARE
NOT PART OF THE PERQUACKEY VOCABULARY!



                                                      00:09:21
YOU MAY NOT MAKE A WORD ENDING IN "S" IF THAT WORD ALSO APPEARS
WITHOUT THE "S" DURING THE SAME TURN.

ALL WORDS MUST BE AT LEAST THREE LETTERS LONG.

YOU MAY NOT ENTER MORE THAN FIVE WORDS CONTAINING THE SAME
NUMBER OF LETTERS IN ANY ONE TURN.
TO ENTER A WORD, SIMPLY TYPE IT IN.

OF COURSE, YOUR ERRORS CAN BE RECOVERED. TO DELETE THE
LAST WORD YOU ENTERED, JUST ENTER ZZ. TO DELETE ANY OTHER
WORD, TYPE ZZ FOLLOWED, WITHOUT A SPACE, BY THAT WORD (FOR
EXAMPLE, ZZBIGBUG WOULD DELETE THE ENTRY "BIGBUG".
TO CONTINUE, PRESS ANY KEY.

                                                      00:09:53

SCORING IS A LITTLE COMPLICATED, BUT THE COMPUTER HANDLES
IT JUST FINE. YOU'LL GET ALL THE DETAILS RIGHT AWAY, BUT UP
FRONT YOU SHOULD KNOW ABOUT THE BONUSES, BECAUSE THEY CAN
REALLY ADD UP.


TO CONTINUE, PRESS ANY KEY.

                                                      00:10:23
REMEMBER, YOU COULD ONLY ENTER FIVE WORDS OF EACH LENGTH?
WELL, ONCE YOU DO ENTER FIVE WORDS IN EACH OF TWO ADJOINING
CATEGORIES (FOR EXAMPLE FIVE THREE-LETTER WORDS AND FIVE
FOUR-LETTER WORDS (AHEM!)), YOU GET A RATHER FAT BONUS.

                 300 POINTS FOR 5 THREES AND 5 FOURS
                 500 POINTS FOR 5 FOURS AND 5 FIVES
                 800 POINTS FOR 5 FIVES AND 5 SIXES
                1200 POINTS FOR 5 SIXES AND 5 SEVENS
                1850 POINTS FOR 5 SEVENS AND 5 EIGHTS
                2700 POINTS FOR 5 EIGHTS AND 5 NINES


TO CONTINUE, PRESS ANY KEY

                                                      00:10:59
NOW, HERE'S THE COMPLICATED PART  SKIP IT IF YOU WISH, BUT IF
YOU BECOME A REAL EXPERT, YOU'LL WANT THIS INFORMATION. SO HERE
IT IS FOR YOU, ANYWAY.
```

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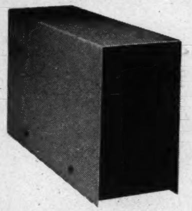

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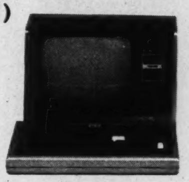

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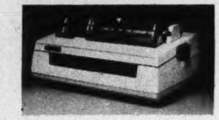

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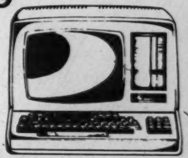

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VISA

```
FOR THE FIRST THREE-LETTER WORD YOU GET 60 POINTS, AND 10 MORE
FOR EACH THEREAFTER. 60, 70, 80, 90, 100 POINTS TOTAL FOR 1,
2, 3, 4 OR 5 THREE-LETTER WORDS.

FOR THE FIRST FOUR-LETTER WORD YOU GET 120 POINTS, AND 20 MORE
FOR EACH THEREAFTER. 120, 140, 160, 180, 200 POINTS FOR 1, 2,
3, 4 OR 5 FOUR-LETTER WORDS.


TO CONTINUE, PRESS ANY KEY.
                                                       00:11:28
AS THE FIVE-LETTER CATEGORY GROWS YOU GET 200, 250, 300,
350 AND 400 POINTS.

SIX LETTER WORDS BRING 300, 400, 500, 600 OR 700 POINTS
FOR ONE THROUGH FIVE ENTRIES.

GET SEVEN LETTER WORDS AND YOU'LL WIPE OUT YOUR OPPONENTS. AS
THAT CATEGORY FILLS YOU GET 500, 650, 800, 950 AND 1100 POINTS.

BUT LOOK AT THE EIGHTS: 750, 1000, 1250, 1500, 1750 POINTS.



TO CONTINUE, PRESS ANY KEY.
                                                       00:11:58
NINE- AND TEN-LETTER WORDS ARE THE SUREST WAY TO DRIVE YOUR
OPPONENTS TO DISTRACTION. NINES BRING 1000, 1500, 2000, 2500,
OR 3000 POINTS FOR ONE TO FIVE ENTRIES.

AND TENS ? ? ? - - - FORGET THE REST OF THE PLAYERS AND LOOK!

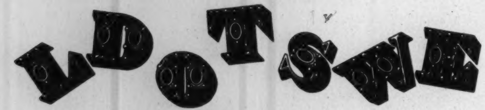
           ^^^^^ 1500, 3000, 5000, 7500 OR 13000 POINTS
                 FOR ONE THROUGH FIVE ENTRIES. ]]]]]



TO CONTINUE, PRESS ANY KEY.
                                                       00:12:33

N O W   S O M E   V E R Y   I M P O R T A N T   D E T A I L S

          D O N ' T   S K I P   T H E S E   !   !
```



```
T O   C O N T I N U E ,   P R E S S   A N Y   K E Y .

                                                       00:13:05

ONCE YOU HAVE ACCUMULATED 2000 POINTS YOU BECOME VULNERABLE!
THAT'S FINE, BECAUSE THEN YOU'LL GET 13 LETTERS TO WORK WITH,
BUT ALSO YOU MUST SCORE A MINIMUM OF 500 POINTS. IF YOU DON'T
SCORE THE MINIMUM, 500 POINTS WILL BE DEDUCTED FROM YOUR SCORE,
AND THE POINTS YOU DID MAKE IN THAT ROUND WILL BE DISALLOWED.

WHEN YOU ARE VULNERABLE, YOU MAY NOT MAKE THREE-LETTER WORDS.


THE GAME IS OVER AT THE END OF THE ROUND IN WHICH ANY PLAYER
REACHES A TOTAL OF 5000 POINTS.

TO CONTINUE, PRESS ANY KEY.

                                                       00:13:33
A WORD ABOUT THE DISPLAY . . .

THE DISPLAY IS SELF-PROMPTING AND WILL HELP YOU A LOT.
IT IS ALSO SELF-EXPLANATORY, LISTING YOUR WORDS BY LENGTH.

WORDS ENTERED AFTER THREE MINUTES WILL AUTOMATICALLY BE
DISALLOWED, AND THE TURN WILL BE ENDED. TO END YOUR TURN
BEFORE THE TIME LIMIT EXPIRES, ENTER XX.

WHEN YOUR TURN IS ENDED, THE COMPUTER WILL EXAMINE ALL THE
ENTRIES AND DISALLOW WORDS MADE BY ADDING S TO OTHER ENTRIES,
DUPLICATE ENTRIES AND WORDS INCONSISTENT WITH THE LETTER LIST.

TO CONTINUE, PRESS ANY KEY.

                                                       00:14:08
DISALLOWED WORDS WILL BE BRACKETED AS IN THE FOLLOWING EXAMPLES.
```

```
WORDS MADE BY ADDING S:           ++EXAMPLES++S
DUPLICATE WORDS:                  ++EXAMPLE++2
WORDS INCONSISTENT WITH LETTERS:  ++EXAMPLE++?
```

```
TO CONTINUE, PRESS ANY KEY.

                                                       00:14:36
AFTER THE COMPUTER DISALLOWS WORDS, YOUR OPPONENTS MAY DO SO,
TOO. THEY MAY CHECK WORDS IN A STANDARD DICTIONARY AND THEN
ENTER ANY CHALLENGES WHICH THE COMPUTER WILL BRACKET WITH
++  ++C.

AFTER ALL CHALLENGES ARE MADE, ENTER XX, AND THE COMPUTER WILL
CALCULATE AND DISPLAY YOUR SCORE AND THEN DISPLAY A SCOREBOARD
FOR ALL PLAYERS.

DURING PLAY, THE LOWER RIGHT CORNER OF THE SCREEN WILL SHOW THE
PLAYER'S SCORE UP TO THE END OF HIS LAST TURN.  THE UPPER RIGHT
WILL DISPLAY THE TIMER.

TO CONTINUE, PRESS ANY KEY.

                                                       00:15:13
YOU CAN PROBABLY COME UP WITH ALL SORTS OF REFINEMENTS TO THE
BASIC GAME.  WHAT WONDERFUL DEVELOPMENTS THEY COULD BE! LIKE
THEME GAMES.  MAYBE DEVOTE ONE WHOLE GAME ONLY TO COMPUTER-
SCIENCE WORDS.

OR SCI FI
         OR WHO KNOWS
                      WHERE YOUR
                                 IMAGINATION
                                            WILL LEAD?

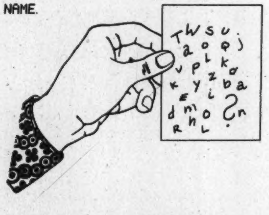


TO CONTINUE, PRESS ANY KEY.

                                                       00:16:17
NOW, IF YOU'D LIKE TO REVIEW THAT, JUST KEY AN R.

BUT IF YOU'RE READY TO PLAY, KEY ANYTHING ELSE!.
```

```
HOW MANY PLAYERS FOR PERQUACKEY (1-4)? 2               00:17:03
TELL ME PLAYER 1 'S NAME.
==> STEVE
TELL ME PLAYER 2 'S NAME.
==> MR. BILL_
```



```
            STEVE PLAYING AND NOT VULNERABLE       00:00:02
                         -

          YOUR LETTERS ARE:  P N S B X O K U E A
     :3:          :4:          :5:          :6:          :7:




      :8:            :9:           :10:




                                                   0
            STEVE PLAYING AND NOT VULNERABLE       00:02:44
```

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Software Division

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Q. After "THE CREATOR®" has produced a program, can it be modified?

A. Yes, the resulting program is modular, fully documented and readily accessible for alterations or deletions.

Q. Does the program created use so much disc space that there is very little space left for record storage?

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Q. Must I be expert or even conversant with Basic Language?

A. No, all questions to and answers from the operator require no computer language knowledge, simple every day English will do.

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A. If you can count your fingers and toes, you'll have no problems.

Q. Will the programs which I produce with "THE CREATOR®" be bulky, slow or amateurish?

A. No, the resulting programs will be sophisticated and extremely fast operating. For example, should you create a mailing list or inventory program, the time for any record to be retrieved and displayed from a full disc would take a maximum of 1 second.

Q. Must the programs produced conform to a predetermined format and file length?

A. No, you determine format and file size to fit your requirements. You may have as many as 22 fields or as few as 1.

Q. Can I develop my own business programs?

A. For the most part, yes.

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A. Your own ingenuity and hardware limitations.

Q. Will future versions of "THE CREATOR®" make my present copy obsolete?

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Computer make ______________ **Model** ______________

CIRCLE 119 ON READER SERVICE CARD

```
          YOUR LETTERS ARE:  P N S B X O K U E A
    :3:          :4:          :5:          :6:          :7:
   BOX         BASK                      SPOKEN
   POX         BONE
   SUN         PUNK
   PUN         SUNK
               BAKE
       :8:              :9:          :10:

                                                              0
                      * *  OVERTIME  * *                 00:03:34
ENTER CHALLENGES, THEN XX _

          YOUR LETTERS ARE:  P N S B X O K U E A
    :3:          :4:          :5:          :6:          :7:
   BOX         BASK                      SPOKEN
   POX         BONE
   SUN         PUNK
   PUN         SUNK
               BAKE
       :8:              :9:          :10:

                                                              0
                      * *  OVERTIME  * *                 00:04:08
              SCORE FOR STEVE FOR THIS ROUND: 590

          YOUR LETTERS ARE:  P N S B X O K U E A
    :3:          :4:          :5:          :6:          :7:
   BOX         BASK                      SPOKEN
   POX         BONE
   SUN         PUNK
   PUN         SUNK
               BAKE
       :8:              :9:          :10:

                                                              0
                                                         00:04:42
                    TOTAL SCORE, ROUND 1

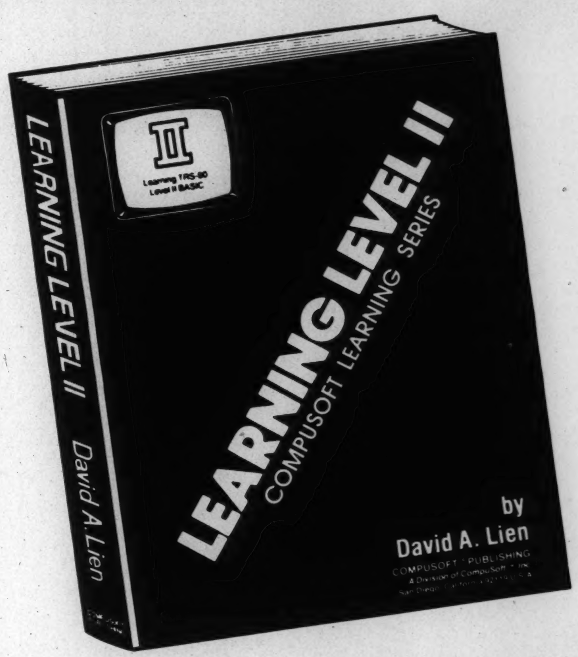
PLAYER           LAST SCORE       TOTAL SCORE      VULNERABLE?
STEVE                590              590               NO
MR. BILL               0                0               NO

TO CONTINUE, PRESS ANY KEY.
```

```
10 REM *** PERQUACKEY, VERSION 2.2  -- 14 MAY 1979
20 REM *** BASED ON "PERQUACKEY"  (C) HOLLINGSWORTH BROS., 1956
30 REM *** AND ON "PERQUACKEY, THE DIFFERENT WORD GAME"
   (C) LEISURE DYNAMICS, INC., 1970
40 REM *** PUBLISHED BY LAKESIDE INDUSTRIES, A DIVISION OF
   LEISURE DYNAMICS, INC., MINNEAPOLIS, MINN.
50 REM *** PROGRAM BY DAVID E. POWERS
60 REM ***              10 WILBEN CT
70 REM ***              NEW HYDE PARK, NY 11040
80 REM ***              516 437 8320
90 POKE &H40A9,&HFF
100 CLEAR 1000
110 XX$=STRING$(64," ")
120 DEFINT B,E,F,I,L,N,P,R,S,V,W
130 CLS: INPUT "IS THE CLOCK DISPLAYED";A$
140 IF LEFT$(A$,1)="Y" THEN 170
150 PRINT: PRINT "RETURN TO DOS AND ENTER CLOCK COMMAND."
160 CMD"S"
170 CLS
180 PRINT CHR$(23)
190 PRINT @ 274, "PERQUACKEY"
200 PRINT @ 708, "DO YOU NEED INSTRUCTIONS?"
210 PRINT
220 LINEINPUT A$
230 IF LEFT$(A$,1)="N" THEN 940
240 CLS
250 PRINT TAB(28) "PERQUACKEY"
260 PRINT:
    PRINT CHR$(34) "PERQUACKEY" CHR$(34) " IS THE DIFFERENT WORD GAME,
FUN FOR ALL, ESPECIALLY THOSE WHO LOVE TO HUNT FOR WORDS AND MEET THE
CHALLENGE OF AN EVER-TICKING CLOCK."
270 PRINT
280 PRINT "THIS VERSION OF " CHR$(34) "PERQUACKEY" CHR$(34) " MAY BE
PLAYED BY UP TO FOUR PLAYERS. YOU CAN EVEN PLAY IT SOLITAIRE, ALWAYS TRYING TO
BETTER YOUR SCORE FROM PREVIOUS GAMES AND ROUNDS. THE COMPUTER"
290 PRINT "WILL SET UP YOUR GAMES, TALLY YOUR SCORES, AND EVEN
MAKE SURE THAT YOU ARE PLAYING FAIRLY."
300 GOSUB 4050
310 PRINT:PRINT"THE OBJECT OF THE GAME IS TO FIND AND SPELL AS MANY WORDS AS
POSSIBLE FROM A LIST OF LETTERS THE COMPUTER WILL GENERATE FOR
YOU, ALL IN A THREE-MINUTE TIME LIMIT. AT FIRST, THE COMPUTER"
320 PRINT "WILL GIVE YOU TEN LETTERS WITH WHICH TO WORK. AS YOUR SCORE"
330 PRINT "INCREASES AND YOU BECOME "CHR$(34) "VULNERABLE" CHR$(34) " YOU WILL
BE ALLOTTED THIRTEEN LETTERS.  BUT YOU WILL HAVE TO ACHIEVE BETTER SCORES
OR BE SET POINTS FOR NON-SUPERIOR PLAY!"
340 GOSUB 4050
350 PRINT "THE COMPUTER WILL PROMPT YOU AS YOU GO, IN CASE YOU SHOULD NEED
ANY HELP IN THE MECHANICS OF THE GAME. BUT FOR YOUR INFORMATION
YOU SHOULD KNOW IN ADVANCE THAT ONLY WORDS IN A STANDARD"
360 PRINT "DICTIONARY ARE ACCEPTABLE. ALL THE PLAYERS SHOULD AGREE
ON ONE BEFORE PLAY IS BEGUN. OF COURSE, LIKE MOST WORD GAMES,
PROPER NAMES, FOREIGN WORDS, ABBREVIATIONS OR CAPITALIZED WORDS"
370 PRINT "ARE NOT ALLOWED. ALSO, YOU MUST RESIST THE TEMPTATION TO USE
PUNCTUATION MARKS. THE COMPUTER WILL NOT ALLOW THEM. THEY ARE
NOT PART OF THE PERQUACKEY VOCABULARY!"
380 GOSUB 4050
390 PRINT "YOU MAY NOT MAKE A WORD ENDING IN " CHR$(34) "S" CHR$(34) " IF THAT
WORD ALSO APPEARS WITHOUT THE " CHR$(34) "S" CHR$(34) " DURING THE SAME TURN."
400 PRINT
410 PRINT "ALL WORDS MUST BE AT LEAST THREE LETTERS LONG.
YOU MAY NOT ENTER MORE THAN FIVE WORDS CONTAINING THE SAME
NUMBER OF LETTERS IN ANY ONE TURN.
TO ENTER A WORD, SIMPLY TYPE IT IN.
OF COURSE, YOUR ERRORS CAN BE RECOVERED. TO DELETE THE"
420 PRINT "LAST WORD YOU ENTERED, JUST ENTER ZZ. TO DELETE ANY OTHER
WORD, TYPE ZZ FOLLOWED, WITHOUT A SPACE, BY THAT WORD (FOR
EXAMPLE, ZZBIGBUG WOULD DELETE THE ENTRY " CHR$(34) "BIGBUG" CHR$(34)"."
430 GOSUB 4050
440 PRINT
450 PRINT "SCORING IS A LITTLE COMPLICATED, BUT THE COMPUTER HANDLES
IT JUST FINE. YOU'LL GET ALL THE DETAILS RIGHT AWAY, BUT UP
FRONT YOU SHOULD KNOW ABOUT THE BONUSES, BECAUSE THEY CAN
REALLY ADD UP.
"
460 GOSUB 4050
470 PRINT "REMEMBER, YOU COULD ONLY ENTER FIVE WORDS OF EACH LENGTH?
WELL, ONCE YOU DO ENTER FIVE WORDS IN EACH OF TWO ADJOINING
CATEGORIES (FOR EXAMPLE FIVE THREE-LETTER WORDS AND FIVE"
480 PRINT "FOUR-LETTER WORDS (AHEM!)), YOU GET A RATHER FAT BONUS.

              300 POINTS FOR 5 THREES AND 5 FOURS
              500 POINTS FOR 5 FOURS AND 5 FIVES
              800 POINTS FOR 5 FIVES AND 5 SIXES"
490 PRINT"                1200 POINTS FOR 5 SIXES AND 5 SEVENS
             1850 POINTS FOR 5 SEVENS AND 5 EIGHTS
             2700 POINTS FOR 5 EIGHTS AND 5 NINES"
500 GOSUB 4050
510 PRINT "NOW, HERE'S THE COMPLICATED PART. SKIP IT IF YOU WISH, BUT IF
YOU BECOME A REAL EXPERT, YOU'LL WANT THIS INFORMATION, SO HERE
IT IS FOR YOU, ANYWAY."
520 PRINT "
FOR THE FIRST THREE-LETTER WORD YOU GET 60 POINTS, AND 10 MORE
FOR EACH THEREAFTER. 60, 70, 80, 90, 100 POINTS TOTAL FOR 1,
2, 3, 4 OR 5 THREE-LETTER WORDS."
530 PRINT "
FOR THE FIRST FOUR-LETTER WORD YOU GET 120 POINTS, AND 20 MORE
FOR EACH THEREAFTER. 120, 140, 160, 180, 200 POINTS FOR 1, 2,
3, 4 OR 5 FOUR-LETTER WORDS."
540 GOSUB 4050
550 PRINT "AS THE FIVE-LETTER CATEGORY GROWS YOU GET 200, 250, 300,
350 AND 400 POINTS."
560 PRINT: PRINT"SIX LETTER WORDS BRING 300, 400, 500, 600 OR 700 POINTS
FOR ONE THROUGH FIVE ENTRIES.
GET SEVEN LETTER WORDS AND YOU'LL WIPE OUT YOUR OPPONENTS. AS
570 PRINT "THAT CATEGORY FILLS YOU GET 500, 650, 800, 950 AND 1100 POINTS.
BUT LOOK AT THE EIGHTS: 750, 1000, 1250, 1500, 1750 POINTS."
580 GOSUB 4050
590 PRINT "NINE- AND TEN-LETTER WORDS ARE THE SUREST WAY TO DRIVE YOUR
OPPONENTS TO DISTRACTION. NINES BRING 1000, 1500, 2000, 2500,
OR 3000 POINTS FOR ONE TO FIVE ENTRIES."
600 PRINT: PRINT "AND TENS ? ? ? - - - FORGET THE REST OF THE PLAYERS AND LOOK!"
610 PRINT:PRINT TAB(10) STRING$(5,CHR$(94))" 1500, 3000, 5000, 7500 OR 13000 POINTS"
620 PRINT TAB(15) "FOR ONE THROUGH FIVE ENTRIES."
    STRING$(5,CHR$(93))
630 GOSUB 4050
640 PRINT CHR$(23)
650 PRINT: PRINT"NOW SOME VERY IMPORTANT DETAILS
     DON'T SKIP THESE ! !"
660 XX$=STRING$(32," ")
670 GOSUB 4050
680 XX$=STRING$(64," ")
690 PRINT: PRINT "ONCE YOU HAVE ACCUMULATED 2000 POINTS YOU BECOME VULNERABLE!
THAT'S FINE, BECAUSE THEN YOU'LL GET 13 LETTERS TO WORK WITH,
BUT ALSO YOU MUST SCORE A MINIMUM OF 500 POINTS. IF YOU DON'T"
700 PRINT "SCORE THE MINIMUM, 500 POINTS WILL BE DEDUCTED FROM YOUR SCORE,
AND THE POINTS YOU DID MAKE IN THAT ROUND WILL BE DISALLOWED."
```

P
Q
U
E
R
K
C
E
A
Y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CIRCLE 122 ON READER SERVICE CARD

```
710 PRINT: PRINT "WHEN YOU ARE VULNERABLE, YOU MAY NOT MAKE THREE-LETTER WORDS."
720 PRINT"
THE GAME IS OVER AT THE END OF THE ROUND IN WHICH ANY PLAYER
REACHES A TOTAL OF 5000 POINTS."
730 GOSUB 4050
740 PRINT "A WORD ABOUT THE DISPLAY . . . ."
750 PRINT: PRINT"THE DISPLAY IS SELF-PROMPTING AND WILL HELP YOU A LOT.
IT IS ALSO SELF-EXPLANATORY, LISTING YOUR WORDS BY LENGTH.
WORDS ENTERED AFTER THREE MINUTES WILL AUTOMATICALLY BE"
760 PRINT "DISALLOWED, AND THE TURN WILL BE ENDED. TO END YOUR TURN
BEFORE THE TIME LIMIT EXPIRES, ENTER XX.
WHEN YOUR TURN IS ENDED, THE COMPUTER WILL EXAMINE ALL THE"
770 PRINT"ENTRIES AND DISALLOW WORDS MADE BY ADDING S TO OTHER ENTRIES,
DUPLICATE ENTRIES AND WORDS INCONSISTENT WITH THE LETTER LIST."
780 GOSUB 4050
790 PRINT "DISALLOWED WORDS WILL BE BRACKETED AS IN THE FOLLOWING EXAMPLES."
800 PRINT"
WORDS MADE BY ADDING S:          ++EXAMPLES++S
DUPLICATE WORDS:                 ++EXAMPLE++2
WORDS INCONSISTENT WITH LETTERS: ++EXAMPLE++?"
810 GOSUB 4050
820 PRINT "AFTER THE COMPUTER DISALLOWS WORDS, YOUR OPPONENTS MAY DO SO,
TOO. THEY MAY CHECK WORDS IN A STANDARD DICTIONARY AND THEN
ENTER ANY CHALLENGES WHICH THE COMPUTER WILL BRACKET WITH
++  ++C."
830 PRINT"
AFTER ALL CHALLENGES ARE MADE, ENTER XX, AND THE COMPUTER WILL
CALCULATE AND DISPLAY YOUR SCORE AND THEN DISPLAY A SCOREBOARD
FOR ALL PLAYERS."
840 PRINT"
DURING PLAY, THE LOWER RIGHT CORNER OF THE SCREEN WILL SHOW THE
PLAYER'S SCORE UP TO THE END OF HIS LAST TURN.  THE UPPER RIGHT
WILL DISPLAY THE TIMER."
850 GOSUB 4050
```

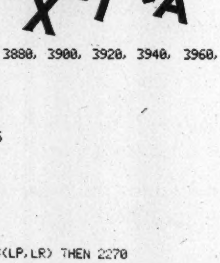
```
860 PRINT"YOU CAN PROBABLY COME UP WITH ALL SORTS OF REFINEMENTS TO THE
BASIC GAME.  WHAT WONDERFUL DEVELOPMENTS THEY COULD BE! LIKE
THEME GAMES.  MAYBE DEVOTE ONE WHOLE GAME ONLY TO COMPUTER-
SCIENCE WORDS."
870 PRINT"
OR SCI FI
        OR WHO KNOWS
                       WHERE YOUR
                                  IMAGINATION"
880 PRINT "                                                   WILL LEAD?"
890 GOSUB 4050
900 PRINT "NOW, IF YOU'D LIKE TO REVIEW THAT, JUST KEY AN R.
BUT IF YOU'RE READY TO PLAY, KEY ANYTHING ELSE!."
910 A$=INKEY$: IF A$="" THEN 910
920 IF A$="R" THEN 240
930 A$=""
940 RANDOM
950 DEF FNA$(A$)=MID$(A$, RND(6),1)+" "
960 DATA FUNIPT, LTORDN, MUSRIG, BYWOLO, VEJQZX, WOPOMC, BRHIKT,
      SRHIFU, AAAEEE, VSYQWS, FHLPBN, JGDKCM
970 READ C1$, C2$, C3$, C4$, C5$, C6$, C7$, C8$, C9$, VA$, VB$,
      VC$
980 CLS
990 INPUT "HOW MANY PLAYERS FOR PERQUACKEY (1-4)";N
1000 IF N<1 OR N>4 THEN 990
1010 DIM W$(7,5), WT(7), WC(7), WD(7), F(7,5), I$(N), V(N), S(N),      S1(N)
1020 FOR LP=1 TO N
1030   PRINT "TELL ME PLAYER" LP "'S NAME.
1040 LINEINPUT "==> ";I$(LP)
1050 NEXT
1060 P=1
1070 R=1
1080 CLS
```

```
1090 PRINT @ 15, I$(P) " PLAYING AND"
1100 IF V(P)=1 THEN PRINT " VULNERABLE"; ELSE PRINT " NOT VULNERABLE";
1110 PRINT @ 1016, S(P);
1120 IF V(P)=1 PRINT @ 323, "NO 3'S"
1130 PRINT @ 261, ":3:";
1140 PRINT @ 272, ":4:";
1150 PRINT @ 283, ":5:";
1160 PRINT @ 296, ":6:";
1170 PRINT @ 309, ":7:";
1180 PRINT @ 648, ":8:";
1190 PRINT @ 663, ":9:";
1200 PRINT @ 679, ":10:";
1210 IF V(P)=0 THEN 1260: REM CHECK FOR VULNERABILITY
1220 V1$=FNA$(VA$)
1230 V2$=FNA$(VB$)
1240 V3$=FNA$(VC$)
1250 LY$=V1$+V2$+V3$
1260 L1$=FNA$(C1$)
1270 L2$=FNA$(C2$)
1280 L3$=FNA$(C3$)
1290 L4$=FNA$(C4$)
1300 L5$=FNA$(C5$)
1310 L6$=FNA$(C6$)
1320 L7$=FNA$(C7$)
1330 L8$=FNA$(C8$)
1340 L9$=FNA$(C9$)
```

PERQUACKEY

```
1350 L0$=FNA$(C9$)
1360 LY$=LY$+L1$+L2$+L3$+L4$+L5$+L6$+L7$+L8$+L9$+L0$
1370 PRINT @ 128, "PRESS ANY KEY WHEN READY.";
1380 FOR LP=0 TO 95: A$=INKEY$: IF A$<>"" THEN 1420ELSE NEXT
1390 PRINT @ 128, XX$;
1400 FOR LP=0 TO 50: A$=INKEY$: IF A$<>"" THEN 1420ELSE NEXT
1410 GOTO 1370
1420 PRINT @ 128, XX$;
1430 POKE &H4041,0
1440 POKE &H4042,0
1450 POKE &H4043,0
1460 PRINT @ 202, "YOUR LETTERS ARE:  " LY$;
1470 CMD"R"
1480 PRINT @ 90,"";
1490 LINEINPUT A$
1500 PRINT @ 64, XX$;
1510 IF PEEK(&H4043)>0 OR PEEK(&H4042)>3 OR (PEEK(&H4042)=3
     AND PEEK(&H4041)>0) THEN PRINT @ 0, XX$; ELSE 1540
1520 PRINT @ 22, "* *  OVERTIME  ** *";
1530 GOTO 1760
1540 IF LEFT$(A$,2)="XX" THEN 1760
1550 IF LEFT$(A$,2)="ZZ" AND LEN(A$)=2 THEN 3320
1560 IF LEFT$(A$,2)="ZZ" THEN 3340
1570 A1$=A$
1580 L=LEN(A$)-3
1590 IF V(P)=1 AND L<1 THEN 1480
1600 IF L<0 THEN 1480
1610 IF L>7 THEN L=7
1620 W$(L,WC(L))=A$
1630 WC(L)=WC(L)+1
1640 IF WC(L)>5 THEN PRINT @ 64, "CATEGORY FULL.  DISALLOWED." ELSE GOTO 1670
1650 WC(L)=WC(L)-1
1660 GOTO 1480
1670 B=64*(WC(L)-1)
1680 IF L=0 PRINT @ 325+B,A$;  : GOTO 1480
1690 IF L=1 PRINT @ 335+B,A$;  : GOTO 1480
1700 IF L=2 PRINT @ 346+B,A$;  : GOTO 1480
1710 IF L=3 PRINT @ 358+B,A$;  : GOTO 1480
1720 IF L=4 PRINT @ 371+B,A$;  : GOTO 1480
1730 IF L=5 PRINT @ 709+B%,A$;  : GOTO 1480
1740 IF L=6 PRINT @ 724+B,A$;  : GOTO 1480
1750 PRINT @ 740+B,A$;  : GOTO 1480
1760 PRINT @ 64, XX$;
1770 PRINT @ 86, "INSPECTING ENTRIES";
```

```
1780 FOR LP=0 TO 7
1790   WT(LP)=WC(LP)
1800   IF WC(LP)>4 THEN WC(LP)=4
1810 NEXT
1820 REM CHECKS FOR WORDS MADE BY ADDING S
1830 PP$="++" : PQ$="++S"
1840 FOR LP=1 TO 7
1850   GOSUB 4030
1860   FOR LQ=0 TO WC(LP)
1870     IF RIGHT$(W$(LP,LQ),1)<>"S" THEN 1930
1880     FOR LR=0 TO WC(LP-1)
1890       IF W$(LP-1,LR)<>LEFT$(W$(LP,LQ),2+LP) THEN 1920
1900       F(LP,LQ)=1
1910       ON LP GOSUB 3860, 3880, 3900, 3920, 3940, 3960,            3980
1920      NEXT LR
1930    NEXT LQ
1940   GOSUB 4040
1950 NEXT LP
1960 REM ELIMINATES WORDS INCONSISTENT WITH LETTER LIST
1970 PP$="++" : PQ$="++?"
1980 FOR LP=0 TO 7
1990   GOSUB 4030
2000 LX$=LY$
2010   FOR LQ=0 TO WC(LP)
2020     IF W$(LP,LQ)="" THEN 2160
2030     IF F(LP,LQ)=1 THEN 2140
2040     LX$=LY$
2050     FOR LR=1 TO LP+3
2060       T$=MID$(W$(LP,LQ),LR,1)
2070       IN=INSTR(LX$,T$)
2080       IF IN=0 THEN 2110
2090       MID$(LX$,IN,1)=" "
2100       GOTO 2130
2110       F(LP,LQ)=1
2120       ON LP+1 GOSUB 3840, 3860, 3880, 3900, 3920, 3940, 3960, 3980
2130     NEXT LR
2140   NEXT LQ
2150   GOSUB 4040
2160 NEXT LP
```


T
A R G E
H U M C T
J ?
L R I S A
X

```
2170 REM ELIMINATES DUPLICATE ENTRIES
2180 PP$="++" : PQ$="++2"
2190 FOR LP=0 TO 7
2200   GOSUB 4030
2210   FOR LQ=0 TO WC(LP)
2220   IF W$(LP,LQ)="" THEN 2320
2230     FOR LR=0 TO WC(LP)
2240       IF LQ<>LR AND W$(LP,LQ)=W$(LP,LR) THEN 2270
2250     NEXT LR
2260     GOTO 2300
```

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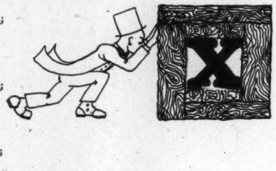
CIRCLE 127 ON READER SERVICE CARD

```
2270     IF F(LP,LQ)=1 THEN 2300
2280      F(LP,LR)=1
2290     ON LP+1 GOSUB 3840, 3860, 3880, 3900, 3920, 3940,          3960, 3980
2300   NEXT LQ
2310   GOSUB 4040
2320 NEXT LP
2330 A$=""
2340 REM ELIMINATES CHALLENGED ENTRIES
2350 PP$="++" : PQ$="++C"
2360 A$=""
2370 PRINT @ 64, XX$;
2380 PRINT @ 64, "ENTER CHALLENGES, THEN XX";
2390 PRINT @ 90, "";
2400 LINEINPUT A$
2410 PRINT @ 64, XX$;
2420 PRINT @ 99, "";
2430 IF A$="XX"THEN 2600
2440 IF LEN(A$)<3 THEN 2400
2450 L=LEN(A$)-3
2460 FOR LP=0 TO WC(L)
2470   IF A$=W$(L,LP) THEN 2510
2480 NEXT
2490 PRINT @ 64, "CHALLENGED WORD NOT FOUND            "
2500 GOTO 2390
2510 IF F(L,LP)=1 THEN 2580
2520 F(L,LP)=1
2530 LQ=LP
2540 LP=L
2550 ON L+1 GOSUB 3840, 3860, 3880, 3900, 3920, 3940, 3960,          3980
2560 PRINT @ 64,XX$;
2570 GOTO 2390
2580 PRINT @ 64, "ENTRY ALREADY DISALLOWED  "
2590 GOTO 2390
2600 PRINT @ 64,XX$;
2610 FOR LP=0 TO 7
2620   WT(LP)=WT(LP)-WD(LP)
2630 NEXT
2640 REM SCORING
2650 IF WT(0)>0 THEN S=50+10*WT(0)
2660 IF WT(1)>0 THEN S=S+100+20*WT(1)
2670 IF WT(2)>0 THEN S=S+150+50*WT(2)
2680 IF WT(3)>0 THEN S=S+200+100*WT(3)
2690 IF WT(4)>0 THEN S=S+350+150*WT(4)
2700 IF WT(5)>0 THEN S=S+500+250*WT(5)
2710 IF WT(6)>0 THEN S=S+500+500*WT(6)
2720 IF WT(7)=1 THEN S=S+1500
2730 IF WT(7)=2 THEN S=S+3000
2740 IF WT(7)=3 THEN S=S+5000
2750 IF WT(7)=4 THEN S=S+7500
2760 IF WT(7)=5 THEN S=S+13000
2770 IF WT(0)=5 AND WT(1)=5 THEN S=S+300
2780 IF WT(1)=5 AND WT(2)=5 THEN S=S+500
2790 IF WT(2)=5 AND WT(3)=5 THEN S=S+800
2800 IF WT(3)=5 AND WT(4)=5 THEN S=S+1200
2810 IF WT(4)=5 AND WT(5)=5 THEN S=S+1850
2820 IF WT(5)=5 AND WT(6)=5 THEN S=S+2700
2830 IF V(P)=1 AND S<500 THEN S=-500
2840 PRINT @ 79, "SCORE FOR " I$(P) " FOR THIS ROUND:" S
2850 S1(P)=S
2860 S(P)=S(P)+S
2870 FOR LP=0 TO 1500 : NEXT
2880 CLS
2890 PRINT
2900 PRINT TAB(20) "TOTAL SCORE, ROUND" R
2910 PRINT
2920 PRINT "PLAYER", "LAST SCORE", "TOTAL SCORE", "VULNERABLE?"
2930 FOR LP=1 TO N
2940   PRINT I$(LP),
2950   PRINT USING "  #####"; S1(LP),
2960   PRINT USING "             #####"; S(LP),
2970   IF S(LP)>=2000 THEN PRINT "             YES" ELSE PRINT "             NO"
2980   IF S(LP)>=2000 THEN V(LP)=1 ELSE V(LP)=0
2990   IF S(LP)>=5000 THEN E=1
3000 NEXT
3010 PRINT : PRINT : PRINT
3020 IF E=1 AND P<N PRINT "GAME OVER AT CONCLUSION OF THIS ROUND"
3030 IF E=1 AND P=N THEN 3250
3040 P=P+1
3050 IF P=N+1 THEN R=R+1
3060 IF P=N+1 THEN P=1
3070 GOSUB 4050
3080 PRINT "STAND BY, PLEASE.";
3090 FOR LP=0 TO 7
3100   WT(LP)=0
3110   WC(LP)=0
3120   WD(LP)=0
3130   FOR LQ=0 TO 4
3140     W$(LP,LQ)=""
3150     F(LP,LQ)=0
3160 NEXT LQ, LP
3170 LX$=""
3180 LY$=""
3190 S=0
```

```
3200 W0$=""
3210 X1$=""
3220 S1=0
3230 A1$=""
3240 GOTO 1080
3250 PRINT "GAME NOW OVER"
3260 PRINT "TO PLAY AGAIN KEY A."
3270 Z$=INKEY$
3280 IF Z$="" THEN 3270
3290 IF Z$="A" THEN RUN
3300 END
3310 REM ROUTINE TO DELETE ENTRIES BY PLAYER
3320 A$=A1$
3330 GOTO 3350
3340 A$=RIGHT$(A$,LEN(A$)-2)
3350 PRINT @ 69, "DELETING "A$"              "
3360 IF LEN(A$)<3 THEN 3430
3370 X1$=STRING$(LEN(A$)," ")
3380 L=LEN(A$)-3
3390 IF L>7 L=7
3400 FOR LP=0 TO WC(L)-1
3410  IF A$=W$(L,LP) THEN 3450
3420 NEXT
3430 PRINT @ 90, "                NOT FOUND";
3440 GOTO 1480
3450 W$(L,LP)=""
3460 W$(L,LP)=W$(L,WC(L)-1)
3470 W$(L,WC(L)-1)=""
3480 W0$=W$(L,LP)
3490 ON L+1 GOTO 3500, 3540, 3580, 3620, 3660, 3700,          3740, 3780
3500 PRINT @ 325+64*LP,X1$;
3510 PRINT @ 325+64*LP,W0$;
3520 PRINT @ 325+64*(WC(L)-1),X1$;
3530 GOTO 3810
3540 PRINT @ 335+64*LP,X1$;
3550 PRINT @ 335+64*LP,W0$;
3560 PRINT @ 335+64*(WC(L)-1),X1$;
3570 GOTO 3810
3580 PRINT @ 346+64*LP,X1$;
3590 PRINT @ 346+64*LP,W0$;
3600 PRINT @ 346+64*(WC(L)-1),X1$;
3610 GOTO 3810
3620 PRINT @ 358+64*LP,X1$;
3630 PRINT @ 358+64*LP,W0$;
3640 PRINT @ 358+64*(WC(L)-1),X1$;
3650 GOTO 3810
3660 PRINT @ 371+64*LP,X1$;
3670 PRINT @ 371+64*LP,W0$;
3680 PRINT @ 371+64*(WC(L)-1),X1$;
3690 GOTO 3810
3700 PRINT @ 709+64*LP,X1$;
3710 PRINT @ 709+64*LP,W0$;
3720 PRINT @ 709+64*(WC(L)-1),X1$;
3730 GOTO 3810
3740 PRINT @ 724+64*LP,X1$;
3750 PRINT @ 724+64*LP,W0$;
3760 PRINT @ 724+64*(WC(L)-1),X1$;
3770 GOTO 3810
3780 PRINT @ 740+64*LP,X1$;
3790 PRINT @ 740+64*LP,W0$;
3800 PRINT @ 740+64*(WC(L)-1),STRING$(LEN(W0$)," ");
3810 WC(L)=WC(L)-1
3820 GOTO 1480
3830 REM S/R TO DELETE INVALID ENTRIES
3840 PP=323 : PQ=328
3850 GOTO 3990
3860 PP=333 : PQ=339
3870 GOTO 3990
3880 PP=344 : PQ=351
3890 GOTO 3990
3900 PP=356 : PQ=364
3910 GOTO 3990
3920 PP=369 : PQ=378
3930 GOTO 3990
3940 PP=707 : PQ=717
3950 GOTO 3990
3960 PP=722 : PQ=733
3970 GOTO 3990
3980 PP=738 : PQ=750
3990 PRINT @ PP+64*LQ,PP$;
4000 PRINT @ PQ+64*LQ,PQ$;
4010 WD(LP)=WD(LP)+1
4020 RETURN
4030 PRINT @ 108, CHR$(143): RETURN
4040 PRINT @ 108, " ": RETURN
4050 PRINT @ 896, "TO CONTINUE, PRESS ANY KEY.";
4060 FOR LP=0 TO 75: AA$=INKEY$: IF AA$<>"" THEN 4100ELSE NEXT
4070 PRINT @ 896, XX$;
4080 FOR LP=0 TO 50: AA$=INKEY$: IF AA$<>"" THEN 4100ELSE NEXT
4090 GOTO 4050
4100 CLS
4110 PRINT
4120 RETURN
```



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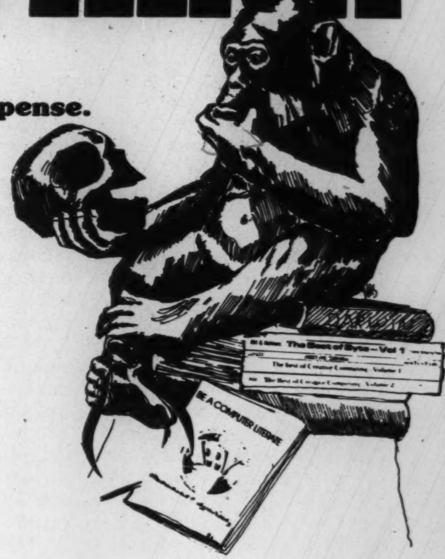
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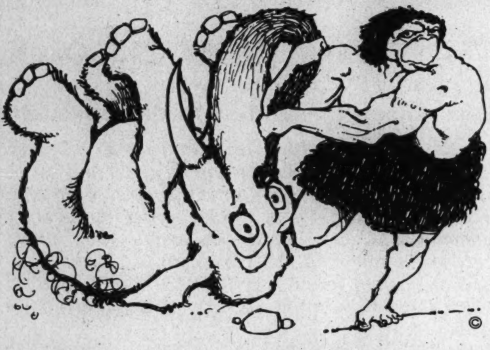
SOFTWARE PROFILE

Bilingual Original Adventure



Betsy Staples

"You are standing at the end of a road before a small brick building. A small stream flows out of the building and down a gully."

So begins Bilingual Adventure, Creative Computing's version of Original Adventure. For those familiar with the Adventure series of games, the first move is obvious. For the benefit of those who have never played, however, a brief explanation is in order.

The object of the game is to find and escape with as many treasures as possible. Each move presents the player with a new situation, which may include a new treasure or peril, and always requires that a decision be made—even if it is only the choice of direction to be taken on the next move.

But, back to the beginning of the game: the first thing the player would want to do is have a look around inside the building, so he or she types a one or two word command and waits to see if the computer responds. If it does not, he must keep trying until he finds words which are included in the vocabulary of the program.

Entering a building is trivial, of course, but killing a dwarf may require some more taxing mental gymnastics. The game itself is quite absorbing and challenging even for one who has never been much of a game player.

Ancelme Roichel has added a new twist to the Creative Computing version of Original Adventure. The game, which is written in the Sam 76 language, may be played in either English or French.

When I first heard about this version of Adventure my reaction was one of enthusiasm on behalf of French speaking computer buffs. But I was skeptical about its value as a tool for foreign language teaching. It was with that attitude that I sat down to try the game for myself.

I played for a little while in English until I became accustomed to the logic and procedures required in the game. Each proper command is met with an acknowleging phrase: "Roger," "OK," or "Done." If the player types in an incorrect or incomplete command, the program responds by repeating the command followed by "what?" ("Open what?") This is amusing the first time or two, but soon becomes tiresome, particularly since nothing that is typed in response is ever accepted.

It was not until I encountered "a vicious looking green snake" that I became curious about the French translation. I typed "French," waited about 15 seconds for the French description of my current location to appear on the screen, and discovered that the snake was an *affreux serpent*.

I also discovered to my surprise that my rusty French was adequate for deciphering most of the descriptions of the snake's surroundings. I was not, however, up to doing away with the snake *en Francais*, so I returned to English long enough to discover that "for ecological reasons, snakes can't be killed here."

Very shortly thereafter I became hopelessly lost in a maze and had to give up. I started over and decided to try the whole thing in French. Outside of the fact that I never could get out of the brick building, I found the experiment very rewarding.

As I went from one situation to another, I remembered the general descriptions and was able either to guess or remember the meanings of most of the French words. The real challenge was remembering enough vocabulary to give the appropriate commands

I had, for example a very difficult time putting down the treasures I was carrying. I tried *"rester," "mettre," "laisser," "deposer,"* and several other verbs that my dictionary suggested. None worked. I switched to English.

On the other hand, once I had come up with the proper infinitive form of the verb, I found that Adventure was not fussy about the conjugation thereof. It would respond to the first person singular *(je prends)* as well as the second person plural *(prenez)* or the infinitive *(prendre)*.

Is it a good way to learn French? Probably not if one is starting from scratch. As a vehicle for practicing the language, however, it seems superb.

Obviously, the student is limited by the vocabulary used in the game, but that is sizable and far from elementary. Much more important is the mental exercise the player gets trying to think of alternate ways to express the same thought. If "put out lamp" fails, for example, he can try "unlight lamp" or "extinguish lamp."

This ability to re-cast a sentence or thought in words and constructions that are familiar is one of the keys to successful foreign language learning. This is a skill that gets a workout even when the game is played in English, and the French version provides even better practice.

When I mentioned Adventure to a member of our editorial staff, he expressed impatience with the procedure of trying to guess the vocabulary recognized by the program. He would prefer, he said, a menu or listing of the vocabulary available. This approach, I believe, would eliminate some of the fun and a large part of the educational value of the game. When speaking to someone in a foreign country, it is frequently necessary to rephrase one's question or idea several times before the other person understands.

One of the most difficult aspects of foreign language teaching is motivating students to learn. There is, after all, a limit to the amount of excitement that can be generated using a 500-word vocabulary, and each addition to the list seems to require a painful round of drills and quizzes.

Bilingual, cont'd...

After only a brief sojourn in the subterranean world of Bilingual Adventure, I had increased my French vocabulary by eight or ten words (including *affreux)*, so I am sure that a persistent student with access to the game over a long period of time could learn quite a bit. There is nothing like being threatened by a knife-wielding dwarf to inspire you either to recall or discover the word for "kill"!

Motivation is desirable, but frustration is not, and not being able to understand or extricate oneself from a situation in a foreign language could be frustrating. This is not a problem with Bilingual Adventure. The ability to change from one language to the other makes it possible to bridge a gap in vocabulary and continue with the adventure. (As I mentioned above, even with the help of a dictionary, I never did discover the French command that would allow me to leave the brick house.)

Since the transition is not accomplished instantaneously, the player is not tempted to switch back and forth frequently. It is much quicker to consult a dictionary than it is to shift to English and then back to French to find the meaning of a word. However, if the whole description is unclear, or all attempts to find an acceptable command have failed, it is very comforting to know that a translation is only 15 seconds away.

The instruction sheet that comes with the disk warns that the material is "PG Rated," and suggests some steps to take "if bawdy material of an erotic nature offends you or your controller." However, in over 12 hours of play, I failed to notice anything that could be considered offensive—with the possible exception of the dispatch of numerous dwarves, which might offend those who are bothered by violence.

The instruction sheet also provides directions for saving a game: " 'preserve' allows you to save the game as it stands and continue later." Unfortunately, it does not tell how to recall the game after it has been saved.

With the exception, then, of the few annoyances I have mentioned—most of which do no more than slow the game—my evaluation of Bilingual Adventure is positive. I think it can be used very effectively in a classroom or tutorial situation for practice and reinforcement of vocabulary and reading skills. And if you get tired of self-improvement, you can always just play it for fun—it should be good for many, many hours of diversion even if you don't know French. □

Bilingual Original Adventure is available on 8" CP/M floppy disk (CS-9004) for $24.95. It runs in a 32K system or, to use the save game feature, 48K. A TRS-80 version will be available in June. Write Creative Computing Software, P.O. Box 789-M, Morristown, NJ 07960.

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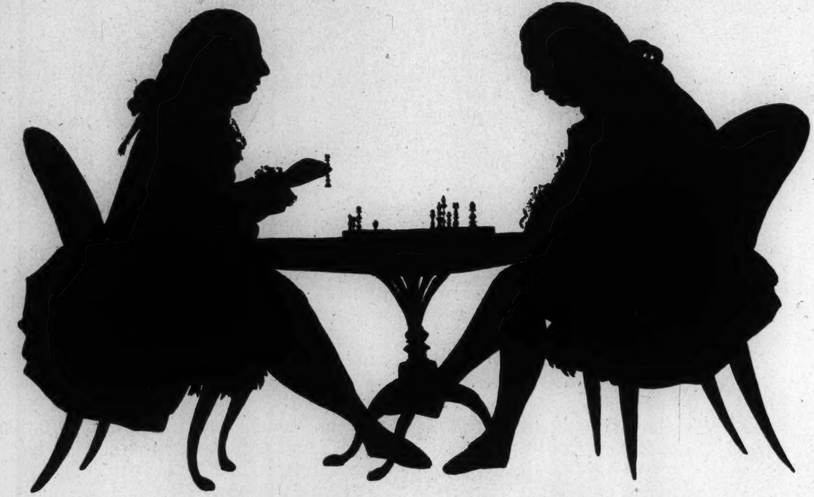
CIRCLE 219 ON READER SERVICE CARD

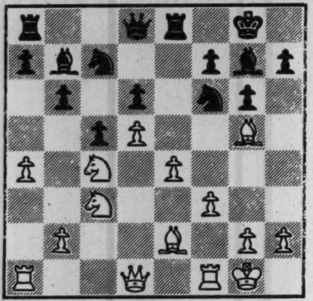
The 1980 North American Computer Chess Championship

This event is the Indy 500 of the computer industry.

Theodore H. Ehara



CHESS 4.9 from Northwestern University, won the North American Computer Chess Championship (NACCC) after drawing BELLE from Bell Laboratories, in the last round battle (see Figure 1). BELLE, who was defending champion, had drawn earlier with CHAOS in the second round of the tournament. This gave BELLE a final score of three against CHESS 4.9's score of three and a half, out of four possible points.



GAME 1

CHESS 4.9 - BELLE

1. P-Q4, N-KB3
2. P-QB4, P-B4
3. P-Q5, P-K3
4. N-QB3, P×P
5. P×P, P-Q3
6. P-K4, P-KN3
7. N-KB3, B-N2
8. B-K2, O-O
9. O-O, R-K1
10. N-Q2, N-R3
11. P-B3, N-B2
12. P-QR4, P-QN3
13. N-QB4, B-QR3
14. B-Kn5, P-R3
15. B-R4, P-KN4
16. B-B2, N-R4
17. N-K3, B-B1
18. Q-B2, N-B5
19. B-B4, B-Q2
20. KR-Q1, Q-B3
21. B-N3, N-R4
22. B-K1, N-B5
23. K-R1, P-R3
24. B-N3, P-N4
25. P×P, P×P
26. R×R, R×R
27. B-B1, P-QN5
28. N-K2, P-N6
29. Q-N1, N-R4
30. B-B2, N-B5
31. N-B4, N×N
32. B×N, B-N4
33. B-N3, R-R5
34. Q-B1, B-B1
35. R-Q2, Q-Q1
36. Q-B1, P-R4
37. K-N1, P-R5
38. B-B2, B-N2
39. N-K3, B×B
40. Q×B, R-R8+
41. R-Q1, R-R7
42. Q-Q3, R×P
43. N-B4, R-QB7
44. P-K5, B×P
45. N×B, P×N
46. Q×QNP, R-K7
47. K-B1, P-B5
48. Q-N7, R-R7
49. B-N6, P-R6
50. Q×N, Q-B3
51. Q-Q8+, Q×Q
52. B×Q, R×P
53. R-K1, P-B6
54. R×P, P-B7
55. R-K8+, K-N7
56. B×P, R×B
57. R-QB8, R-N7
58. P-Q6, R×P
59. P-Q7, R-Q7
60. K-N1, R×P
61. R×P, R-Q3
62. R-B2, K-B3
63. K-R2, draw

FIGURE 1

A highlight of this tournament was an exhibition game given by CHESS 4.9. In response to a theoretical argument as to whether a strong chess player could defeat a weaker player who was aided by a strong program, CHESS 4.9 and its programmer, David Slate (expert) played David Levy (International Master). Playing the Bird's Opening, Slate and CHESS 4.9 lost the game after fifty moves (see Figure 2).

Left to Right: Joe Condon, David Slate, Larry Atkin and Ken Thompson in the Chess 4.9 - BELLE game. Joe Condon and David Slate study the position, while Larry Atkin and Ken Thompson await BELLE's reply.

Crosstable of the North American Computer Chess Championship

Crosstable of the North American Computer Chess Championship

Program	rate	perf	1	2	3	4	total
1 CHESS 4.9	2040	2099	8W	9W	3W	2D	3+
2 BELLE	1950	1982	5W	4D	7W	1D	3
3 DUCHESS	1889	1942	10W	7W	1L	4W	3
4 CHAOS	1775	1794	12W	2D	9W	3L	2+
5 L'EXCENTRIQUE	0	1640	2L	12W	8W	6D	2+
6 MYCHESS	0	1552	7L	10W	11W	5D	2+
7 SARGON 3	0	1614	6W	3L	2L	9D	1+
8 OSTRICH 80	1450	1374	1L	11W	5L	10D	1+
9 BLITZ 6.9	0	1516	11W	1L	4L	7D	1+
10 AWIT	1325	1314	3L	6L	12W	8D	1+
11 BS '66 '76	0	1045	9L	8L	6L	12W	1
12 RUFUS	0	644	4L	5L	10L	11L	0

Example of how to read this crosstable:

L'EXCENTRIQUE wasn't rated before this tournament, but had a performance, in the tournament, of 1640. It lost its first round game against BELLE, then won its next two games against RUFUS and OSTRICH 80. In the final round it drew its game with MYCHESS, for a final result of 2+ (2.5). A win counts as a point, a draw counts as half a point.

TABLE 1

This event, which is held by the American Computing Machinery in their annual convention, has been compared to the Indy 500 for the computer industry. While the same

---

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The original computer version of Adventure was written by Willie Crowther and Don Woods in Fortran on a PDP-10 at MIT. In this version the player starts near a small wellhouse. Upon entering the house, he finds food, water, a set of keys and a lamp. Armed with only these items, he must set out to explore the countryside in search of treasure and other objects of play. He must also confront dwarfs, snakes, trolls, bears, dragons, birds, and other creatures during his quest. The game accepts one-or two-word commands such as GET LAMP* SOUTH* or KILL DWARF. Of course, if you don't have the proper tool to carry out an action, or if you do something foolish, you may find yourself in big trouble.

In playing the game you wander thru various 'rooms' (locations), manipulating the objects there to try to find 'treasures'. You may have to defeat an exotic wild animal to get one treasure, or figure out how to get another treasure out of a quicksand bog. You communicate thru two-word commands such as 'go west', 'climb tree', 'throw axe', 'look around'.

Adventure

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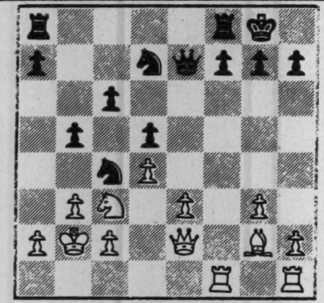
Championship, cont'd...

elements of man and machine exist in both events, the battle of ideas seems to overflow in the NACCC. Not only have programmers taken different approaches to their use of hardware and programming, but their research in improving the chess playing program strikes at the very core of problems facing the developers of artificial intelligence.

A good example of the diversity of thought at the NACCC is shown through the answers given by two programmers in separate interviews. Answering similar questions, David Kittinger and Ken Thompson display their personal understanding of "where we are" and "where we should go" to improve the electronic chess player.

Ken Thompson, along with Joe Condon, has developed and refined BELLE for the last ten years. It is run on a PDP 11/70 with a special move generation hardware (100 K words; 16 bits; 800,000 inst/sec). BELLE plays about expert level and is written in C and assembly language. It requires 16K for the program and 1K for the tree search. BELLE has a book of 200,000 opening positions, along with special end-game databases that are also incorporated into the program.



GAME 2
CHESS 4.9 + Slate vs. Levy

1. P-KB4, P-Q4
2. N-KB3, N-KB3
3. P-K3, B-N5
4. P-QN3, QN-Q2
5. B-N2, P-QB3
6. B-K2, B×N
7. B×B, Q-B2
8. N-B3, P-K4
9. P×P, N×P
10. Q-K2, B-Q3
11. P-N3, Q-K2
12. O-O-O, O-O
13. B-N2, B-R6
14. K-N1, B×B
15. K×B, P-QN4
16. QR-KB1, KN-Q2
17. P-Q4, N-B5+
18. P×N, Q-N5+
19. K-B1, Q×N
20. P×NP, P×P
21. B×P, N-N3
22. B-N3, N-B5
23. B×N, P×B
24. Q-K1, Q-R6+
25. K-Q2, QR-N1
26. K-K2, R-N7
27. Q-Q2, R×RP
28. R-QN1, Q-K2
29. R-R1, Q-K5
30. KR-QB1, R×R
31. R×R, Q-N7+
32. K-Q1, Q-R8+
33. Q-K1, Q-N2
34. K-K2, R-N1
35. R-R4, R-B1
36. R-R5, Q-K5
37. R×P, Q×BP+
38. Q-Q2, Q-K5
39. Q-K1, P-B6
40. K-B2, P-R4
41. R-R5, P-R5
42. R-R1, P-R6
43. Q-R1, Q-B7+
44. K-B3, R-B3
45. Q-QN1, R-B3+
46. K-N4, Q-K2+
47. K-R4, R-R3+
48. K-N5, Q-R4+
49. K-B4, R-B3+
50. K-K4, Q-B4 mate

FIGURE 2

David Levy points to a demonstration board and comments to the audience while the programmers await their machines' move.

Participating in its first ACM tournament, David Kittinger took MYCHESS to the Paul Masson tournament and in unofficial competition achieved a performance of a "C" player. MYCHESS runs on a Cromeco Z-2D (64K; 8 bits; 600,000 inst/sec) and was one of three micro-computers in the field of twelve contestants. The program is written in Z-80 assembly language and requires 19K bytes. MYCHESS has a small book of 3,000 opening positions and searches 9,000 positions in every move.

CC: Do you, yourself play chess?

DK: Yes. I'm about a 1900 (class A) rated player, which helps.

KT: No . . . (being a chess player) wouldn't help or hinder programming a chess program. It would be just a waste of time.

CC: What do you think of the micro-computers, compared to the big machines?

DK: These micros, you're talking about a 1/2000 or so computing speed and yet their level of skill is certainly higher than 1/2000. They play a very capable game.

KT: I don't think micros are fast enough to compete. Right now the name of the game is horsepower. Micros just have to get a lot faster before they compete well, or some programming revelation will have to occur that I don't foresee.

CC: What are your thoughts about the evaluator function (evaluating positional advantages) in micros?

KT: It doesn't buy it. They'll (micros) lose the game. You know you'll have a very, very pretty position and the other opponent will cut your throat. It only takes one mistake to lose — totally. You can build up a good position, but at some point you've got to win and while you're building up, you can't lose. There are a lot of moves in tactics that will lose a game instantly. Look at SARGON (talking about the recent SARGON-BELLE game, see Figure 3). They had a totally won game and made one move that was overwhelmed by tactics.

DT: (Discussing the SARGON-BELLE game) SARGON came close to winning it, indicating that a direction to pursue in these chess computer games is the evaluator function. That's overlooked. Between their program and my program, I think we have the best evaluator tied in with a full width search of any program. 4.9 also has a good evaluator, I understand, although they cut a lot of it out, going for speed, because they think extra plys means better chess — maybe they're right — SARGON should have beaten BELLE last night. It came very close. In fact they had a draw by repetition in the bag, but because SARGON was even it tried to avoid the draw. But it had a draw against BELLE, which won this tournament last year.

It must be noted that Ken Thompson intends to improve his hardware by building a parallel machine. ("Something the size of a suitcase.") This machine should speed BELLE up by a factor of 100. Thompson estimates it will add 2-3 plys more to BELLE's search and added, "That's a jump in hardware of about twenty years." He hopes to complete the machine for the 1981 NACCC.

Levy discussing his game with the audience following its completion.

BELLE also has a micro-version, run an a LSI-11. Unlike SARGON or MYCHESS, Thompson is not selling the program commercially. This little BELLE had beaten an earlier version of SARGON. When asked if Thompson had ever thought of entering the little BELLE into a micro-tournament, his reply was short and to the point. "No. It's much too strong."

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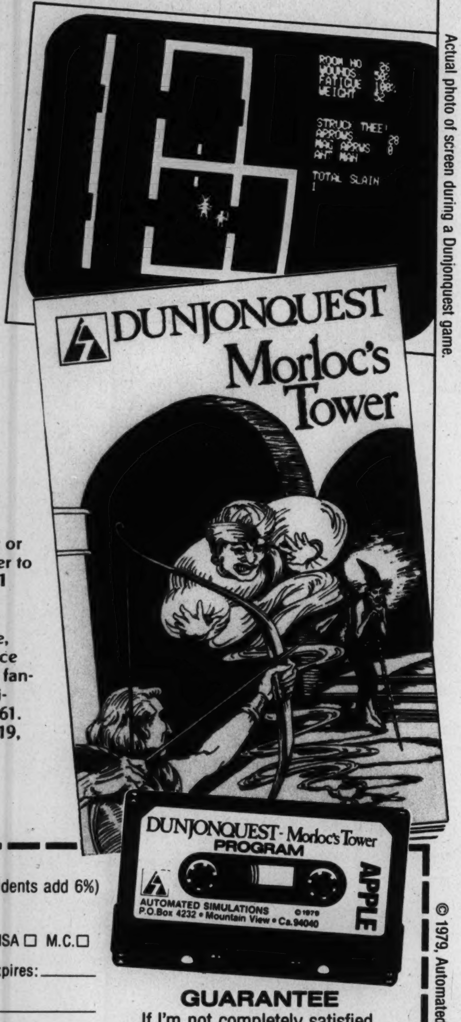

Actual photo of screen during a Dunjonquest game.

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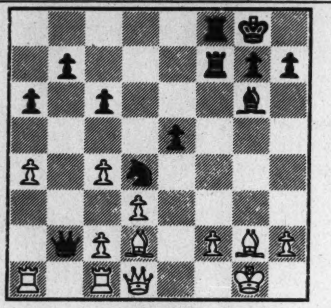
CIRCLE 111 ON READER SERVICE CARD

Championship, cont'd...



GAME 3
SARGON 3 - BELLE

1. N-QB3, P-Q4
2. P-K4, N-KB3
3. P×P, N×P
4. N×N, Q×N
5. N-K2, N-B3
6. P-Q3, P-K4
7. N-B3, B-QN5
8. B-Q2, B×N
9. P×B, B-B4
10. P-QB4, Q-Q5
11. B-K3, Q-B3+
12. B-Q2, Q-R6
13. P-N4, B-Q2
14. B-N2, O-O
15. O-O, P-B4
16. Q-N1, QR-N1
17. P×P, B×P
18. Q-N5, P-QR3
19. Q-Q5+, R-B2
20. KR-N1, R-Q8
21. Q-B3, N-Q5
22. Q-Q1, P-B3
23. B-N5, QR-KB1
24. B-K3, Q-B6
25. R-B1, Q-N2
26, P-QR4, B-N3
27. QR-N1, Q-R3
28. R-R1, Q-B6
29. B-Q2, Q-N7
30. QR-N1, Q-R7
31. QR-Q-N7
32. B-K3, K-R1
33. QR-N1, Q-R3
34. R-R1, Q-B6
35. B-Q2, Q-N7
36. QR-N1, Q-R7
37. R-R1, Q-N7
38. B-K3, R-K2
39. QR-N1, Q-R6
40. R-R1, Q-B6
41. B-Q2, Q-N7
42. QR-N1, Q-R7
43. B-N4, KR-B2
44. R-R1, Q-N7
45. QR-N1, Q-R7
46. B×R, R×B
47. R-R1, Q-N7
48. K-B1, R-KB2
49. QR-N1, Q-R7
50. Q-K1, N×P
51. Q×P, B×P+
52. K-N1, Q-R6
53. Q-N8+, R-B1
54. Q×P, N-Q5
55. R-R1, Q-B4
56. R-Q1, B×P
57. K-N1, B-Q4
58. B×B, Q×B+
59. K-N1, N-K7+
60. K-B1, Q-B6
61. K-K1, Q×P
62. K-Q2, R-Q1+
63. K-B2, N-Q5+
64. K-Q3, N-N4+
65. Q-Q7, R×Q+
66. K-B4, Q-B7+
67. K-N4,
Q-B3 mate

FIGURE 3

When asked if CHESS 4.9 would pursue advances in speed along with BELLE, David Slate replied, "No. We really aren't into the hardware business." In addition, the most interesting member of the Northwestern team didn't show up at the tournament — CHESS 5.0. CHESS 5.0 is a complete rewrite of the program. It wasn't entered in the 1980 NACCC because they were still getting the bugs out of it. Instead of assembly language, CHESS 5.0 is written in Fortran. According to Slate, it is playing master-level chess.

If all these different ways of improving chess programs seem confusing, things might clear up a little, probably after the 1981 North American Computer Chess Championship.

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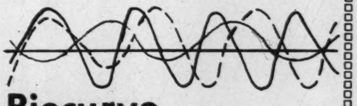

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Interview with Gordon Bell

At Brown University Symposium (L to R) Kent Curtis (NSF), Gordon Bell (DEC), Peter Denning (Purdue Univ.)

David Ahl

Dr. Gordon Bell is Vice President of Engineering of Digital Equipment Corporation, the world's largest manufacturer of minicomputers. He was previously a Professor of Computer Science at Carnegie-Mellon University. Publisher David Ahl, an alumnus of both Carnegie-Mellon and DEC, talked to Gordon following his presentation at Brown University. Here are some excerpts from their conversation.

Dave: In contrast to some people in the educational community, you seem to feel that computer research can be done at places other than universities and posed a couple of alternatives giving the Japanese example; do you think you could get any agreement on that? Also, where should it be done?

Gordon: Need certainly plays a big part. Research is sometimes done by accident and sometimes with planning. In the meantime, one recognizes that, essentially, a flow of ideas is needed to make a product. But we sometimes have problems and we don't see immediate solutions and one can't be developed; we do research based on meaning.

Dave: For example, do you think the Japanese system, where government doesn't fund any kind of research except by pumping money into companies, works better?

Gordon: They find out about a lot of research through the industry and industry puts the money back in, but I don't know whether they control on that basis. I would certainly like some similar controls because that would solve the basic problem of flow. If you've got ideas the biggest problem is how to develop and research them. Getting it to move out of this environment is virtually impossible. An idea may sit there for years. They sit there and will never be resolved. I really believe in a healthy buyer-seller relationship. There are people who have some research needs and so people do that because there is a need.

Dave: Which generally doesn't exist in the university?

Gordon: Certainly NSF is not oriented that way; you are writing for a group of peers. It has no other purpose than to have a by-product with which to educate the faculty so they can teach and to generally get some more knowledge in the field, which is fine. It's a self perpetuating community.

Dave: You also said that you didn't feel we need any more language compilers or typesetting systems but gave a couple of examples of business and the arts being more productive areas for new applications. Specifically, what do you think are areas where young people can concentrate and have some expectation of payoff if they want to do something interesting in computer science. Should it be done through a company or should they work on their own with a microcomputer. Where are the greatest opportunities for significant achievement?

Gordon: In the whole application, pick an area and do work in that area. Some of them aren't going to materialize for awhile but, for example, the use of data bases for tracing historical ideas and doing fundamental concept analysis will ultimately exist, but it will be rough going for a time. I think large data bases will trigger a lot of ideas in themselves.

Dave: What kind of data bases and how would people get access to them?

Gordon: I think personal data bases will be developed and used as tools. For example, right now we are building a computer museum and there are already a couple of programs; one that keeps track of everything in the museum, whether a manual or a part, or whether there is a manual for a part, whether there is a photograph of a part or a negative attached to that; just keeping track of those kinds of things. That was a natural thing that we needed. Also, a program to lead one through the museum; those kinds of things. There is some fairly interesting work being done now in computer graphics and computer art. Those are all possibilities. I don't know what the opportunities are in the language area, but there are new ideas that say maybe we can do reasonable machine-aided translation. We would like to see a machine-aided translation aid, say for translating technical manuals. That's a really clear kind of application because the manuals are typically very sterile and you can have quite a stylized description particularly in describing how a piece of software works.

Dave: Our main criticism of most manuals is that they are just not clear enough.

I think large data bases will trigger a lot of ideas in themselves.

Gordon: This actually might help. You could write them in a more stylized form. I'm trying to push to use the 500 word basic language. It is a language which deals with a fairly small vocabulary; the theory is that it would be easier from which to translate — either mechanically or by human endeavor, from one natural language to another language. People get too hung up on vocabulary or syntax vs. context; that's why I need a wide vocabulary to express my thoughts.

Bell, cont'd...

Dave: I spoke to Dick Neisser recently, in the Artificial Intelligence field, and, after being involved in doing language translation and dealing with many failures, his strong feeling is that a computer will never be able to translate language because it doesn't have the same cultural heritage to provide the context in which thoughts and sentences are expressed; that without understanding the context, it couldn't really translate.

Gordon: That's right. If you try the general problem it can't do general language translation.

Dave: But by translating text books or manuals you provide the context.

Gordon: Yes, an extremely well defined context. Also remember that I said "machine-aided," not machine translation. Just getting 90% of the thing out and then cleaning it up may be the right way to do it.

Dave: Just prior to the time I left DEC in 1974 I remember Ken Olsen (president of DEC) saying that he couldn't see any need or any use for a computer in someone's home and, as I recall, at the time you took some issue with that. Then he repeated it several years later at the World Future Society meeting in Boston and some people in the audience took issue with that. How does he feel today?

Gordon: We have a word processing terminal at home, and it also runs the payroll and the accounts payable. I've had a terminal at home for at least ten years, probably more. Right now we do a lot of word processing, a little computing for accounts payable but fundamentally the real computing is somewhere else. We use it 10 to 20% of the time as a terminal to the electronic mail system. Ken also has a terminal at home. I personally wouldn't recommend anything other than a terminal for home because microcomputers aren't big enough. Right now I don't think I want a home computer because I have always used a big computer and why should I live with a little computer when I can have access to a big computer?

Dave: Are there any projects on the horizon at DEC that push down into the real micro area besides the LSI-11?

Gordon: We just announced an 11-23. It's a little cheaper than the current LSI-11. We are gradually getting into that area. We don't want to give up this main base that we have at the current price level. Lots of the machines do end up in the home like that.

Dave: What's a useful thing for younger children, say 6th, 7th and 8th grade to do with computers other than play games and write games and have fun with them.

Gwen: Edit their papers. Writing and rewriting by hand is really difficult for a kid.

Gordon: With a computer, they can do a real quality job. Maybe the best thing that happens is you get kids into thinking rapidly.

Dave: I see text editing probably affecting the biggest base of the population.

The Brown Symposium, "Bridging the Gap Between Theory and Practice" brought together Gordon Bell and Don Knuth.

Gordon: For younger children I think, voice, music and graphics I/O are probably the only things that are going to attract them. Games may be attractive but I think it is really important for all children to learn about programming. I think, from a computer design standpoint, it means we've got to have attractive enough transducers so they find out that it is worth them getting on so they can get some reasonable output. We've gone through the high school era where essentially students had no reward for writing a program, because they didn't get anything back. They would write a program to play blackjack, but blackjack isn't that much fun. Usually it was on a teletype and that's not much fun either. We have a daughter who would like to learn to program; she's a musician and if we had good transducers on the machines I think she'd go on immediately. We're not very far away from having that rich environment where there is a reward to have it do something.

Dave: We've been working recently with the ALF music boards for the Apple. It gives you a regular staff of music. You put the note where you want it with your paddle control. Then press the button and you can program up to six parts and play them backward, forward and upside down and experiment anyway you want. You can really relate to that. ☐

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Complexity Theory and Elementary Mathematics

Kenneth Sipser, Ph.D.
and
Michael Sipser, Ph.D.

In a very general way, the theory of complexity as it refers to computer technology, deals with determining the extent of the equipment needed for the completion of a specified task. In the process, it seeks to reduce the number of components through developing greater efficiency amongst those that are in a system, and by producing new designs for expediting procedures within systems. In another sense, complexity theory can be viewed as a means of examining the time required to accomplish a specified task. Not only is the issue of determining the complexity of a problem of significant theoretical interest, but it is also of substantial practical value since, if an efficient algorithm can be brought to bear on the solution of a problem, then the running time required for problems containing large numbers of cases might be significantly shorter.

Interestingly, in certain problems, the time required for solution is directly related to the number of multiplications required. We assume that the basic computer arithmetic operation is addition, requiring, for all intents and purposes, insignificant processing time. Multiplication, on the other hand, based on multiple additions generally requires time which is substantially greater than that of addition. Thus, if a problem containing a number of multiplications is reduced by one or more of them, even at the cost of several additions, the solution method has been made more efficient.

In order to demonstrate this point, suppose we examine the elementary problem of finding the coefficients of the polynomial resulting from the multiplication of the two binomials, say, 5X + 3 and 2X + 1. Our usual procedure would require four multiplications as follows:

$$\begin{array}{rrr}
5X & + & 3 \\
2X & + & 1 \\ \hline
\underline{10}X^2 + & \underline{6}X & \\
+ & \underline{5}X & + \underline{3} \\ \hline
\underline{10}X^2 + & \underline{11}X & + \underline{3}
\end{array}$$

Kenneth Sipser, Ph.D., Dept. of Secondary Education, State University College, Oswego, NY 13126.
Michael Sipser, Ph.D., Computer Science Div., University of California, Berkeley, CA 94710.

Can the coefficients of the product polynomial be found in three multiplications? Surprising as it may seem, the answer is yes! First, add the coefficient and constant term of the first binomial 5 + 3 = 8, and of the second 2 + 1 = 3. Find the product of these sums 8 × 3 = 24. That's one multiplication. Multiply the coefficients of the X terms 5 × 2 = 10, and of the constant terms 3 × 1 = 3. That takes care of 3 multiplications. The last two products obviously provide us with the coefficients of the X^2 and constant terms, respectively. The sum of the last two products 10 + 3 = 13, subtracted from the product of the sums 8 × 3 = 24 yields the coefficient of the X term. Algebraically, given $AX + B$ and $CX + D$, let $S_1 = A + B$ and $S_2 = C + D$ represent the respective sums of A and B, and C and D. The product of these sums $S_1S_2 = AC + AD + BC + BD$. This is one multiplication. $A \times C = AC$ and $B \times D = BD$ produce the coefficients of the X^2 and constant terms, respectively. The differences $S_1S_2 - (AC + BD)$ produces the coefficient of the X term.

Complexity theory can be viewed as a means of examining the time required to accomplish a specific task.

While we may reduce the number of multiplications required for finding the product of two polynomials from 4 to 3, a much more dramatic reduction may be made in the number of multiplications for the product of two matrices.

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix}\begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} AE + BG & AF + BH \\ CE + DG & CF + DH \end{pmatrix}$$

The product of two 2 × 2 matrices, employing the usual rules of the inner product for matrix multiplication requires eight multiplications. As the order of the matrices increases, the number of multiplications rises cubically so that two 3 × 3's require 27 multiplications, two 4 × 4's, 64 multiplications. A remarkable property of matrix multiplication is that the product of two 2n × 2n matrices can be carried out by partitioning each of the matrices into four n × n matrices, calculating their respective inner products, and using these in the resulting 2 × 2 matrix multiplication

$$\left(\begin{array}{c|c} A & B \\ \hline C & D \end{array}\right)\left(\begin{array}{c|c} E & F \\ \hline G & H \end{array}\right) \quad \left(\begin{array}{c|c} AE + BG & AF + BH \\ \hline CE + DG & CF + DH \end{array}\right)$$

where the A, B, . . . are square matrix partitions of the original matrices. A reduction in the number of multiplications in the 2 × 2's by even one would therefore be significant, not so much for the saving represented by 7 multiplications over 8, but by the increasing difference developed as the order of the matrices increases. For example, in the case of the 4 × 4's this procedure yields 7^2 or 49 multiplications whereas it would ordinarily require 4^3 or 64 multiplications.

The Bridges of Koenigsberg is an old and famous problem which because of its simplicity has an appeal for students at all levels.

Before you start trying to solve this problem, be advised that in 1969, V. Strassen[1] in a paper "Gaussian Elimination Is Not Optimal" produced the 7 multiplication solution for the 2 × 2's. This is reproduced here without rationale, since an analysis of the procedure is beyond the scope of this paper. Given two 2 × 2 matrices:

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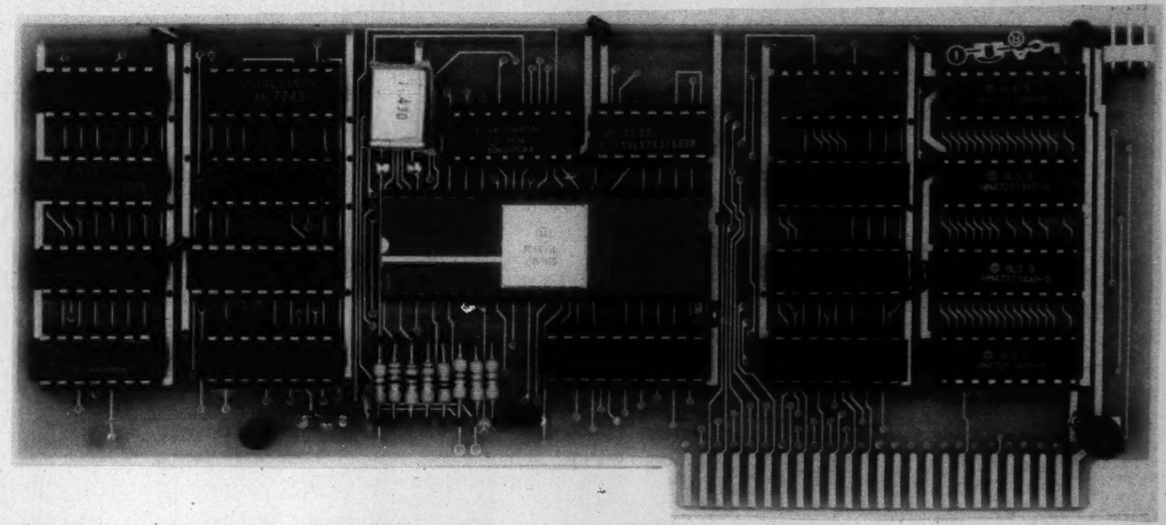

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Complexity, cont'd...

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} \begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} P_{11} & P_{12} \\ P_{21} & P_{22} \end{pmatrix}$$

where

$P_{11} = m_1 + m_2 - m_4 + m_6$
$P_{12} = m_4 + m_5$
$P_{21} = m_6 + m_7$
$P_{22} = m_2 - m_3 + m_5 - m_7$

where

$m_1 = (B - D)(G + H)$
$m_2 = (A + D)(E + H)$
$m_3 = (A - C)(E + F)$
$m_4 = (A + B)H$
$m_5 = A(F - H)$
$m_6 = D(G - E)$
$m_7 = (C + D)E$

The seven multiplications (m_i) are brought together by selective additions and subtractions in the four P_{jk}, so that $P_{11} = AE + BG$, etc.

Very recently another mathematician, Victor Pan,[2] of the IBM Thomas J. Watson Research Center, in a paper titled *"Strassen's Algorithm Is Not Optimal"* improved on this technique still further. Unfortunately, his results are also too intricate to be reproduced here.

Another aspect of complexity theory deals with the efficiency of algorithms as they relate to the solution of some mathematics problems. In general, those problems which can be solved algorithmically fall into certain categories according to the extent of their solvability. Two of these are: 1) P, the class of polynomial time problems, and 2) NP, the class of nondeterministic polynomial time problems. The first of these, containing problems on the order of the Bridges of Koenigsberg, have efficient solutions and are therefore solvable in polynomial time. This refers to that set of algorithms which can produce a solution in polynomial time growth as the problem size increases as opposed to those whose time growth is exponential. The Bridges of Koenigsberg is an old and famous problem which because of its simplicity has an appeal for students at all levels. In old Koenigsberg, now Kalinin, USSR, there are two islands in a river which are connected to each other and to the two banks by seven bridges (see Figure 1). The question is: can one start at any point and cross all of the bridges exactly once? The problem can be attacked by brute force, that is, by listing all of the possible paths, and then finding the solution(s) if there are any. The mathematician, Leonhard Euler, solving this problem more efficiently, wrote of the listing solution: "This method is too tedious and too difficult because of the large number of possible combinations, and in other problems where many more bridges are involved it could not be used at all."[3] Euler produced a point-line graph of the islands and bridges (see Figure 2), argued that each point, except the start and end, required one line leading to it and one leading away and must therefore have an even number of lines connecting them to other points. Since the point-line graph has four points all of which contain an odd number of lines, the tour is impossible. This solution method was qualitatively simpler than the brute force listing; Euler had produced a solution in polynomial time. On the other hand, problems which can be solved only through methods which are comparable to the brute force listing or other such inefficient methods are classified as nondeterministic polynomial time.

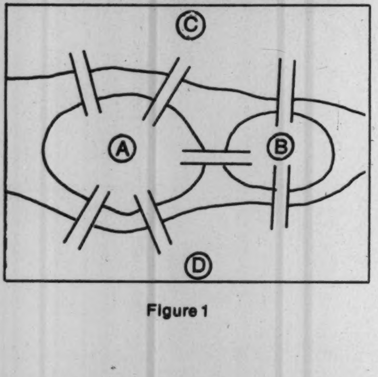

Figure 1

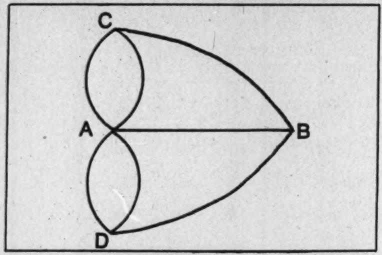

Figure 2

According to Ron Graham of Bell Telephone Laboratories "the trouble with this brute force approach is that as the number of tasks in a set becomes large the number of possible priority lists (and thus the number of schedules) grows so explosively that there is no hope of examining even a small fraction of them. If there are n tasks in a set, the number of different lists is n!, or n(n–1) (n–2) . . . 1, a very large number even for relatively small values of n. For example, when there are 20 tasks, even if a computer could check as many as a million schedules per second, it would take more than 70,000 years to check all 20 lists!"[4]

A problem which falls into the class NP is that of determining whether an integer is composite. There is no way of finding the factors of an integer other than the inefficient method of looking for proper divisors. There are indeed divisibility techniques for ruling out some unnecessary trials, but no algorithm exists which will reduce the number of trials to a point wherein the problem could be solved in polynomial time. Other well known problems which fall into this class are:

1) The Traveling Salesman Problem: Given a set of cities (points), find the shortest round-trip route connecting lines (air routes) in which all of the cities are visited.

2) The General Scheduling Problem: Given a set of identical machines, with a set of tasks to be performed, each with specific requirements for deadline time, priority of importance, running time and precedence constraints, find the most efficient schedule for assigning these tasks among the given machines.[5]

3) The Three Color Map Problem: Given a set of regions of a map, color all of the regions in one of three colors in such a way that no two adjoining regions share the same color.

Today's computers and telephone exchanges present problems beyond our understanding, but these systems are dwarfed by even the humblest biological systems.

There is a set of problems, of which the above three are members, which form a kind of super category, NP-complete. If a polynomial time algorithm can be found for any one of them, then with minor adjustments, the algorithm can be applied to all NP problems solving them in polynomial time as well. Accordingly, it is likely that NP-complete problems are difficult, if not impossible to solve efficiently.

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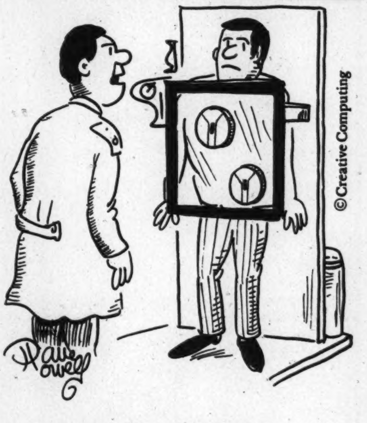
Complexity, cont'd...

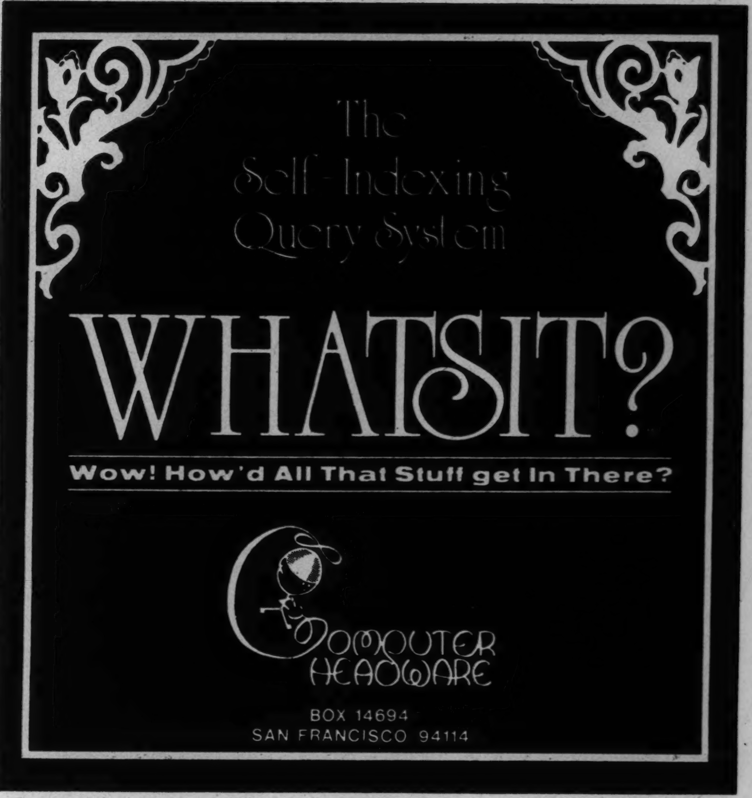
In this article we have attempted to overview this new and exciting field of complexity theory which links computer science with mathematics, and ultimately to the solution of theoretical as well as practical problems in society and technology. In an article on complexity theory as it refers to the solution of problems in telephone technology, Pippenger says: "Today's computers and telephone exchanges present problems beyond our understanding, but these systems are dwarfed by even the humblest biological systems. While complexity theory struggles with problems within its reach, far greater problems lie beyond."[7] □

References

1. V. Strassen, "Gaussian Elimination Is Not Optimal," Num. Math., Vol. 13, (1969), pp. 354-356.
2. Victor Pan, "Strassen's Algorithm Is Not Optimal. Trilinear Technique of Aggregating, Uniting and Cancelling for Constructing Fast Algorithms for Matrix Operations."
3. Euler, Leonhard, "The Seven Bridges of Koenigsberg". The World of Mathematics, edited by James R. Newman, Simon and Shuster, Vol. 1, p. 574.
4. Ronald L. Graham, "The Combinatorial Mathematics of Scheduling," Scientific American, Vol. 238, No. 3, (March, 1978), p. 128.
5. While most scheduling problems fall into the class NP, some special cases have been found to fall into P(polynomial time). Very recently Barbara Simons of the Computer Science Division at the University of California at Berkeley reported in her paper *"A Fast Algorithm for Single Processor Scheduling"* of her discovery of one such special case in which running time was held constant.
6. Harry R. Lewis and Christos H. Papadimitriou, "The Efficiency of Algorithms," Scientific American, Vol. 238, No. 1, (January, 1978), p. 107.
7. Nicholas Pippenger, "Complexity Theory", Scientific American, Vol. 238, No. 6, (June, 1978), p. 124.



"You have a slipped disk."



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3

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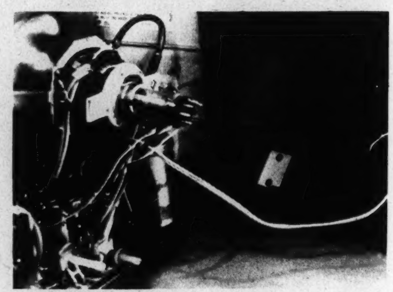
Double outlet socket installed in back of monitor.

This problem affects most TRS-80 owners, but it is easy to fix: Just install a double socket on the back of your CRT monitor, as shown in Photo 1. Then you can plug your computer power supply and your cassette recorder into the monitor. Only one cord (the monitor cord) then needs to be plugged into a wall socket. A further advantage is that now the whole system can be turned on or off with one switch, the monitor "Power" switch.

How is this modification done? First, you must collect the necessary tools and materials. For tools, you will need a ¼″ nut driver (it looks like a screwdriver, but has a ¼″ hex socket on the end), a drill and bits, a coarse file, a screwdriver and a soldering iron. Materials required are a double electrical socket (the type used for wall outlets), about two feet of fairly heavy-duty electrical wire, solder and two nuts for the socket mounting screws (they are not included with the socket, as the socket screws were intended to screw into a wall outlet box).

Now to work! First unplug the monitor, and place it face down on a soft surface. Be sure that it has been "off" long enough for the hazardous high voltage inside the case to dissipate. Use the nut driver to remove the five hex-headed screws holding the back onto the monitor (four are in deep recesses). Gently remove the back, being very careful of the CRT socket, which protrudes and is fragile. Mark where you want to put the double outlet socket, making sure that it will clear things inside the case. A spare outlet socket cover plate makes a good marking template. Drill starter holes through the plastic back, then file them to shape to accept the double outlet socket. This usually takes a bit of file and try, file and try. Drill holes for the socket mounting screws and mount the socket in place. Fasten one end of the wire pair under the screws of the socket, and solder the other end to the terminals under the CRT yoke, as shown in Photo 2.



Inside of monitor, showing outlet socket installation.

These terminals are shown in Figure 1. Now carefully put the back on again, being sure that the added wire has enough free space, and that the socket doesn't interfere with anything.

You can now plug your computer power supply and your cassette recorder into the back of your monitor and eliminate that tangle of power cords. Neatness triumphs! ☐

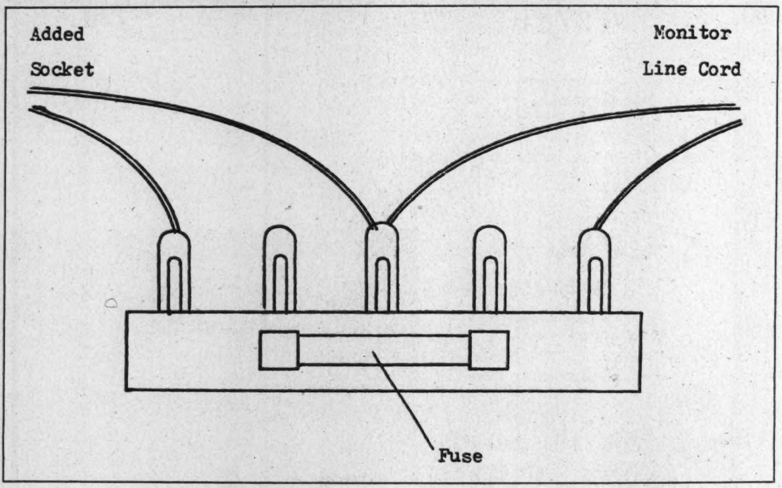


Figure 1.
Connections to monitor terminal board.

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```
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  END
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```

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by
Gene
Bellinger

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Acorn produces several other utility programs for the TRS-80*. These include *Aterm*, *Term-80*, and *Numbering* by Tom Stibolt; *Disassembler*, *Tape Utility*, and *Disk Utility* by Roy Soltoff. Ask for these and other quality Acorn programs at your local computer store.

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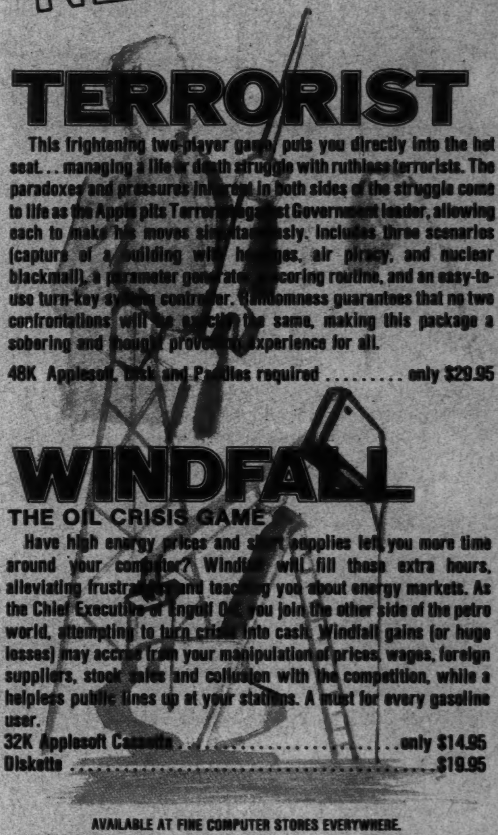

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Stan and the Two-Horse Team

N. B. Winkless, Jr.

When Stanislaus came whipping into the living room in his Little League gear, his pop looked up from the Racing Form and smiled.

"My boy!" said Pop, "I have a problem for you and your pile of semiconductors."

'Two bits an hour for consultation and the programming, and a buck a page for printouts," Stan said. "What's up?"

"That ought to come to about three or four dollars," Pop said.

"The meter is running," Stan said. "C'mon up to my room."

"Strictly a hypothetical case," Pop said. "We don't much approve of horse race gambling, you know." Stan gave him a look and a nod. So Pop laid it out:

In any one race, there might be two horses that look too good to ignore. Either could win. Suppose a person wants to bet on both. Now, each will be offered at some price, such as 5 to 2, or 4 to 1, or whatever. Can we make the computer tell us how much to bet on each, so as to yield a profit of, say, a hundred dollars?"

"Easy," said Stan, turning on the power and loading Basic. And he wrote:

```
10 INPUT "FIRST HORSE PAYS";A
20 INPUT "...FOR WHAT BET";B
30 INPUT "SECOND HORSE PAYS";C
40 INPUT "...FOR WHAT BET";D
50 INPUT "PROFIT WANTED";P1
```

And he stopped to think.

Then he wrote:

```
100 X=B/(A+B):Y=D/(C+D)
```

"These will be decimal fractions. I think if we add them, and subtract their sum from 1 . . . "

```
110 Z1=X+Y: Z=1-Z1
```

"And then find the ratio between each decimal value and the remainder Z . . . and multiply that by the profit you want . . . we'll have it." He wrote:

```
120 B1=INT((X/Z)*P1+.5):D1=INT((Y/Z)*P1+.5)
```

"I've gone for the integer, rounding up. Okay?"

Pop let his jaw hang open but didn't speak.

```
130 PRINT B1, D1
```

"Ready?" said Stan. "We'll use what you said, 5 to 2 and 4 to 1, and one hundred dollars." He tapped in RUN, and filled in the INPUTS.

The screen said "56 39".

"Want to check that out?"

Pop did. He found that 56 bet at 5 to 2 would yield 140, minus the 39, to leave a profit of 101. And 39 at 4 to 1 would yield 156, less the 56, for a profit of 100.

"Terrific!" Pop said.

"Good," said Stan. "That'll be 15 cents, unless you want me to print it."

"Er . . . " said Pop. "I'd really like to have it on paper, as tables, y'know? And there are other ratios —"

"How many?" said Stan.

"Uh, forty-nine altogether."

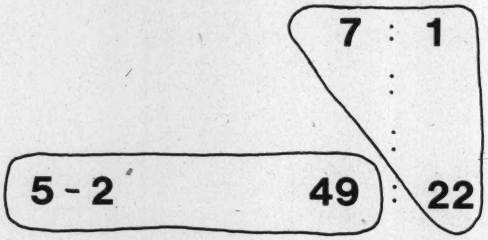
"Gulp," said Stan. "The calculations are easy, but the formatting is going to be a problem, and I'm not sure about that rounding-up routine. Do you mind if we have supper before I knock this off?"

Stan is fast, but it took him most of Sunday to get things to the point where he showed his pop a partial printout:

Exhibit A Stan on bet ratios

```
           7 ¦ 1      8 ¦ 1      9 ¦ 1     10 ¦ 1     11 ¦ 1     12 ¦ 1     13 ¦ 1
6 - 5    109 ¦ 30   105 ¦ 26   103 ¦ 23   100 ¦ 20    99 ¦ 19    98 ¦ 17    96 ¦ 16
7 - 5     92 ¦ 28    89 ¦ 24    87 ¦ 21    85 ¦ 19    84 ¦ 17    83 ¦ 16    82 ¦ 14
3 - 2     85 ¦ 27    82 ¦ 23    80 ¦ 20    79 ¦ 18    78 ¦ 17    77 ¦ 15    76 ¦ 14
8 - 5     79 ¦ 26    77 ¦ 23    75 ¦ 20    74 ¦ 18    73 ¦ 16    72 ¦ 15    72 ¦ 14
9 - 5     69 ¦ 25    68 ¦ 21    67 ¦ 19    65 ¦ 17    64 ¦ 15    64 ¦ 14    63 ¦ 13
2 - 1     62 ¦ 24    60 ¦ 20    59 ¦ 18    58 ¦ 16    58 ¦ 15    57 ¦ 14    56 ¦ 12
5 - 2     49 ¦ 22    48 ¦ 19    47 ¦ 17    46 ¦ 15    46 ¦ 14    45 ¦ 13    45 ¦ 12
3 - 1     40 ¦ 20    40 ¦ 18    39 ¦ 16    38 ¦ 14    38 ¦ 13    38 ¦ 12    37 ¦ 11
7 - 2     35 ¦ 20    34 ¦ 17    33 ¦ 15    33 ¦ 14    32 ¦ 12    32 ¦ 11    32 ¦ 11
4 - 1     30 ¦ 19    30 ¦ 17    29 ¦ 15    29 ¦ 13    28 ¦ 12    28 ¦ 11    28 ¦ 10
9 - 2     27 ¦ 19    26 ¦ 16    26 ¦ 14    26 ¦ 13    25 ¦ 12    25 ¦ 11    25 ¦ 10
5 - 1     24 ¦ 18    24 ¦ 16    23 ¦ 14    23 ¦ 13    23 ¦ 12    23 ¦ 11    22 ¦ 10
```

The calculations are based on $100 wins (approximate). The left-hand number is the bet on the pick at the left end of the line. The right-hand number is the bet on the pick at the top of the column. Example:



If your two picks go at 7 to 1 and 5 to 2, you put $22 on the 7-1 shot and $49 on the 5-2 shot. If the 7-1 comes home you win 7 times 22, or $154, and lose $49 — profit $105. If the 5-2 comes home you win 5/2 times 49, or $122.50, and lose $22 — profit $100.50.

To win more or less, just adjust the bets. That is, to win $50, bet half of what the tables show. To win $200, bet twice what the tables show.

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Two-Horse, cont'd . . .

"I'm going to fill one page with this," he said, "and there will be six more pages."

"Wow," said Pop. "Will I understand the program?"

"I think so. I wrote in a lot of explanation, just for you."

```
1 !FORMATTED FOR 7 COLUMN RATIOS AND 1 RATIO AT THE LEFT
9 POKE(16R0512)=130:! Sets maximum printer width
10 GOSUB 450: PRINT CHAR$(6);
11 !      Turns on printer, clears the screen
20 DIM A(49),B(49),C(49),D(49):!We'll need these subscripts
21 ! We're 'filling the boxes' with ratios to draw on in succession
22 C(1)=1:C(2)=1:C(3)=2:C(4)=1:C(5)=3:C(6)=4:C(7)=1:C(8)=6
23 D(1)=9:D(2)=5:D(3)=5:D(4)=2:D(5)=5:D(6)=5:D(7)=1:D(8)=5
24 C(9)=7:D(9)=5:C(10)=3:D(10)=2:C(11)=8:D(11)=5:C(12)=9:D(12)=5:C(13)
=2:D(13)=1:C(14)=5:D(14)=2:C(15)=3:D(15)=1:C(16)=7:D(16)=2
25 C(17)=4:D(17)=1:C(18)=9:D(18)=2:C(19)=5:C2=5
26 FOR C1=20 TO 39:C2=C2+1:C(C1)=C2:NEXT C1:C1=0:C2=0
27 C(40)=30:C(41)=35:C(42)=40:C(43)=45:C(44)=50:C(45)=60:C(46)=70:C(47
)=80:C(48)=90:C(49)=99
28 FOR D1=19 TO 49:D(D1)=1:NEXT D1:D1=0
29 FOR D8=1 TO 49:A(D8)=C(D8):B(D8)=D(D8):NEXT D8: D8=0
60 D$=CHAR$(27)+CHAR$(31)+CHAR$(9):OPEN 0"*P":PUT 0 D$;:CLOSE0
61 ! Line 60 sets horizontal character spacing
70 GOSUB 460:!Turns off the printer
80 INPUT "HOW MUCH YOU WANNA WIN ON THIS PAIR OF BETS";P1
91 INPUT "START TOP LINE WHERE";T1:! Can't get it all on one page, so.
..
93 INPUT "START LEFT LINE WHERE";L1:! Mostly for trial runs
94 C1=T1: C2=T1
95 R=12
99 Q2=0
100 !Starts printing the top line of ratios
102 C1=C1+1:! Counters to move up the line of subscripted boxes
103 C2=C2+1
106 A=A(C1):B=B(C2):! Extracts the values from the boxes
110 K$=STR$(A):L$=STR$(B):!Turns the numbers into strings for formatti
ng
111 IF LEN(K$)<6 THEN K$=" "+K$: GOTO 111:! Formats neatly
112 IF LEN(L$)<6 THEN L$=L$+" ": GOTO 112
115 M$=K$+"¦"+L$
120 !Next line turns on the printer again
129 GOSUB 450:PRINT TAB(R);M$;:!Printing the headers
132 R=R+15
136 Q2=Q2+1:IF Q2=7 THEN Q2=0:R=0:T=0:GOTO 160:!Limits column headers
to seven
140 GOSUB 460
150 GOTO 100:! Returns to find the next values
160 ! I used to have a line here.
190 C3=L1:C4=L1:! Permits choosing start-point for left column
200 ! Prepparing to print the second ratio, left column
201 IF T4=49 THEN 1000:!Cuts off after49 lines
202 C3=C3+1
203 C4=C4+1
205 IF C3>49 THEN 1000
206 C=C(C3):D=D(C4):! Sets up next ratio in left column
208 X$=STR$(C)
209 Y$=STR$(D)
210 IF LEN(X$)<4 THEN X$=" "+X$:GOTO210
218 GOSUB 450:! Turns on printer again
220 PRINT:PRINT X$+"-"+Y$;:! Prints the left ratio
230 T=9
240 GOSUB 460:! Turns off printer
290 C1=T1: C2=T1:! Picks values from boxes to correspond with headers
300 T=13:! Sets tab stop
302 C1=C1+1:!Increments box-count as we go along
303 C2=C2+1
304 IF C1>50 THEN 1000:!Cuts off if too deep.  Do we need this?
306 A=A(C1):B=B(C2)
307 T3=T3+1
310 GOSUB 400:!We'll calculate at 400+
315 IF D1<0 THEN A$="   NO ": GOTO 322:!If impossible, say No
316 A$=STR$(D1):! ... else make a string of the value
317  IF LEN(A$)<6 THEN A$=" "+A$: GOTO 317
322 IF B1<0 THEN B$=" NO   ":GOTO 339
328 B$=STR$(B1):!Stringing helps the formatting in neat columns
329  IF LEN(B$)<6 THEN B$=B$+" ": GOTO 329
339 GOSUB 450:! Turns on the printer again
340 E$=A$+"¦"+B$: PRINT TAB(T);E$;:! Prints the bets
345 T=T+15:!Incrementing the tab set
350 GOSUB 460:! YOU know; turns off printer
355 IF T3=7 THEN T3=0:T4=T4+1:GOTO200:! Cuts off after seven columns
360 GOTO 302:! Returns to cycle for next bet on the line
400 X=B/(A+B): Y=D/(C+D):!The decimal frac of the two odds — remember
?
405 IF A/B=D/C THEN D1=-1:B1=-1: GOTO 440:! Can't work out if
406 ! the two ratios are reciprocals.  Think about it.
410 Z1=X+Y: Z=1-Z1:! Adds them and takes their complement of 1, per br
ief example
420 B1=INT((X/Z)*P1):!Calcs per example
430 D1=INT((Y/Z)*P1)
431 ! Abandoned the simple '+.5' rounding-off method...
432 ! because it didn't seem to work for everything.
434 IF B1<0 OR D1<0 THEN 440:! Eliminates certain impossibles
435 M1=B1*(A/B)-D1:IF O AND M1>=P1 THEN O=0: GOTO 440
436 IF M1<P1 THEN B1=B1+1:GOTO435
437 M2=D1*(C/D)-B1
438 IF M2<P1 THEN D1=D1+1: GOTO 437
439 IF M2>=P1 THEN O=1:GOTO435
440 RETURN:!Goes back into program at 320
445 !435 to 439 is one giant effort at rounding-off.  Obvious?
450 PRINT CHAR$(16);: RETURN
460 PRINT CHAR$(15);: RETURN

1000 !PRINT: PRINT: PRINT:PRINT:PRINT CHAR$(16)
1005 PRINT "THE FORM ' XX ¦ YY' SHOWS  BETS TO GAIN $100 (APPROX)"
1006 PRINT "USING THE XX FIGURE FOR ODDS AT THE LEFT,"
1007 PRINT "     THE YY FIGURE FOR THE ODDS AT TOP OF COLUMN."
1010 PRINT "TO GAIN MORE OR LESS, MULTIPLY OR DIVIDE THE $100."
1020 PRINT "(THAT IS, TO GAIN ONLY $50, BET HALF WHAT'S SHOWN."
1025 PRINT "TO GAIN $200, BET TWICE WHAT'S SHOWN.)"
1030 PRINT CHAR$(15)
1100 END: !At last!!
READY
```

"Er, Stanislaus," Pop said. "Suppose we adjust this to handle three or four horses in a race . . . "

"I've been thinking about that, Pop. Four horses would take the tables to 7 times 49 times 49 pages. At a buck a page, that'll be about $17,000. I'm game for it if you are Pop. Pop? Pop?"☐

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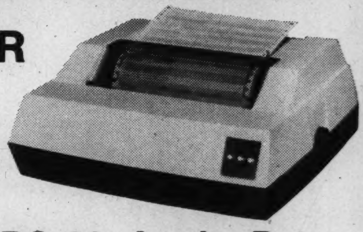

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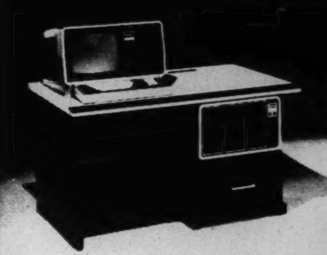

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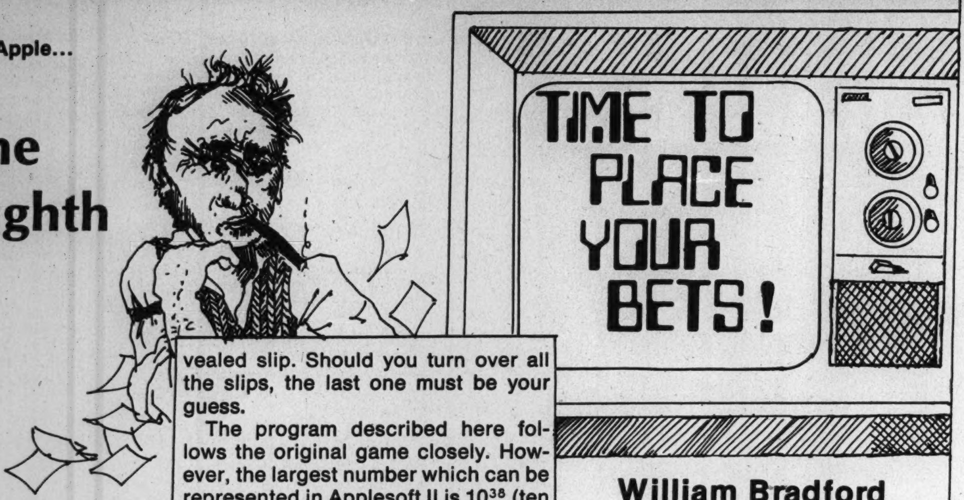
A new game for the Apple...

Ten to the Thirty-Eighth


TIME TO PLACE YOUR BETS!

William Bradford

Readers of Martin Garner's book "New Mathematical Diversions from Scientific American," may recognize the game described here. It is a version of the game "Googol," discussed in Gardner's book. I will explain later why I changed the name of the game. I have also added some twists which you may find of interest.

> **A googol is the number ten multiplied by itself one hundred times.**

Invention of the original game of Googol is attributed to John H. Fox, Jr. and L. Gerald Marnie. As described in Garnder's book, the game is played by having someone (the computer in this case) select a number of slips of paper. On the back of each slip, a positive number is written which you are not allowed to see. The values of the numbers range from small fractions up to numbers the size of a "googol" or larger. A googol is the number ten multiplied by itself one hundred times, or "ten-to-the-one-hundredth." The game thus derives its name from the not very ridgidly defined upper limit to the numbers written on the slips.

When all the numbers have been written down, the slips are randomized and placed face down. You then turn the slips face up, one at a time. The object is to stop when you turn up the number which you guess to be the largest. The last slip which you choose to turn up is your guess. You may not go back to a previously revealed slip. Should you turn over all the slips, the last one must be your guess.

The program described here follows the original game closely. However, the largest number which can be represented in Applesoft II is 10^{38} (ten to the thirty-eighth), hence the name of this version. Also, you get to choose the number of slips to use (from 3 to 14). These two facts tend to help you since you know that with a small number of slips to choose from, a number of 10^{37} or greater is almost certainly the largest. In the original game, the googol is not necessarily the upper limit, so that you are never certain of any large number.

I will not go into the detailed analysis of the odds of your finding the highest number. I'll only quote the results of the argument attributed to L. Moser and J. R. Pounder. You may derive it for yourself or refer to Gardner's book.

The strategy is to select p slips out of the n available. Note the largest value among the p slips and then continue selecting from the remaining slips until you find a larger number. The following formula gives the probability of finding the largest number in n slips;

$$\frac{p}{n}\left(\frac{1}{p}+\frac{1}{p+1}+\frac{1}{p+2}\cdots+\frac{1}{n-1}\right)$$

Given n, p is determined by picking a value for p which gives the largest value to the above expression. For example, if $n = 10$ then $p = 3$. For other values of n, you are urged to determine p for yourself. (You didn't buy that computer just to play Star Trek, did you?) Of course, as I mentioned above, the fact that you know the upper bound to the possible values does put the odds a little more in your favor.

While writing the program to play this game, it occurred to me that it might be interesting to skew the odds a little. Since the computer is turning over the slips, it is possible for it to lie to you about the value of any slip. The false value you get is chosen at random, so it may be higher or lower than the true value. If knowing that the machine may be lying to you is not enough, you can have it tell you when it is lying. Of course, it won't tell you until after you have made a bet or chosen another slip.

You now know the essential facts about the game. The program was written for an Apple II in Applesoft II, so it should be fairly portable to other machines using Microsoft's Basic. The program is set up to handle from one to four players. Players make their bets before selecting a slip to turn over. Only one slip is turned over at a time, so players should work out who does the selecting. When a slip is turned over, each player is offered the chance to stop. All players may continue to bet until all the players have chosen. Bets may not be decreased, but they may remain fixed at any value. When the last player has selected, all of the strips are revealed with their true values. The slip with the largest value is shown in flashing mode. Wins and losses are computed and displayed and the players' funds adjusted accordingly. At this time new players may be added, the number of slips changed, or the game option may be changed.

> **The googol is not necessarily the upper limit**

The program shown in the accompanying listing has some features which are designed with the Apple II video output in mind. The strips are shown in the INVERSE video mode, while the bets and available funds are shown in the NORMAL video mode.

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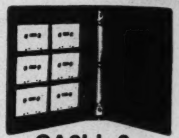
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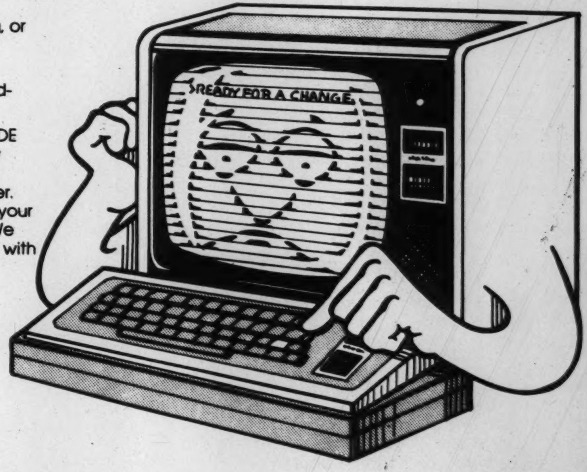

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10^{38}, cont'd . . .

When a player wins, the word WIN is shown in FLASHING mode above his bet. Similarly, the winning number is shown as a flashing number. If hard copy output is desired, several statements (205, 403, 406, 1207 and 1314) will require some modification. In fact, for a hard copy only device, statements 1200 through 1220 can be deleted.

Since the computer is turning over the slips, it is possible for it to lie to you about the value of any slip.

In the course of writing this article, it occurred to me that it would be interesting to see a version of the game where the computer is a player. Perhaps an interested reader could contribute a program to do so to Creative Computing. Another option would be to have the computer display a blank slip instead of lying. The slip would not be turned over until all bets were in. Other possibilities include more sophisticated schemes for having the computer lie, such as telling you that it has lied when it really hasn't. Of course, we humans can generally lie better than a computer (at least until a HAL 9000 type of computer shows up), so there are many such variations. Take advantage of the "Input/Output" column to share your ideas. In any case, the idea is to have a little fun with your brain and its extension, your computer.

For those of you who are wondering about the origin of the term "googol," is was invented by a nine year old child, a nephew of mathematician Dr. Edward Kasner. Dr. Kasner, a respected teacher, is noted as having given lectures on the mathematics of infinity, topology and other advanced mathematical subjects to kindergarten-age children. The reasoning of Dr. Kasner's nephew concerning the finite value of googol is interesting, and is described in the selection by Drs. Kasner and Newman referenced below. ☐

References

Gardner, Martin, New Mathematical Diversions from Scientific American, Simon and Schuster, New York, 1966, Chapter 3, Problem 3.

Kasner, Edward and James R. Newman "New Names for Old" in The World of Mathematics, Simon and Schuster, New York, 1956, Volume 3, page 2009.

```
                SAMPLE RUN

RUN
10^38
(TEN TO THE THIRTY-EIGHTH)
A BETTING GAME FOR THE APPLE II
PROGRAMMED BY L. W. BRADFORD
DO YOU WANT INSTRUCTIONS? (Y/N)N

GAME OPTIONS
 1STRAIGHT UP GAME (I DON'T LIE)
 2'RUSSIAN ROULETTE'(I LIE TO YOU)
 3LIKE NO. 2, BUT I TELL YOU WHEN
 I AM DEALING A BOGUS NUMBER
IF THIS ISN'T CLEAR,SEE THE INSTRUCTIONS
WHICH? 3


HOW MANY PLAYERS? (1 TO 4) 1

YOU'RE OUT OF CASH NO. 1
DO YOU WISH TO BORROW SOME? Y
OK, HOW MUCH? (LIMIT IS $1000) 1000
  HOW MANY SLIPS OF PAPER DO YOU WISH TO  PICK FROM? (MAX = 14)
?9


BETS  0
FUNDS 1000
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?5
BETS  5
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?5
695520.399
DO YOU WISH TO STOP NOW NO. 1?N
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?5

BETS  5
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?2

2.40168801
DO YOU WISH TO STOP NOW NO. 1?N
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?10

BETS  10
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?7
.055058695
DO YOU WISH TO STOP NOW NO. 1?N
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?10

BETS  10
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?8

3.51407399E+29
DO YOU WISH TO STOP NOW NO. 1?Y


ALL BETS ARE NOW IN
4328953.03
2.40168801
4952400.91
7.5659165
695520.399
133182.867
.055058695
3.51407399E+29

47.9456399
THE CORRECT NUMBER WAS 3.51407399E+29 !
WIN
10
FUNDS
1010
?

DO YOU WISH TO CHANGE GAME OPTION?N
DO YOU WANT TO CHANGE THE NUMBER OF PLAYERS?N
BETS  0
FUNDS 1010
  HOW MANY SLIPS OF PAPER DO YOU WISH TO  PICK FROM? (MAX = 14)
?3
```

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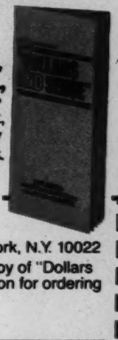

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BETS  0
FUNDS 1010
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?1000

BETS  1000
FUNDS 1010
WHICH STRIP DO YOU WISH TO SEE??2

5.866947E+27
DO YOU WISH TO STOP NOW NO. 1?Y


ALL BETS ARE NOW IN
.427343843       1
5.866947F+27     2

1701507.38       3
THE CORRECT NUMBER WAS 5.866947E+27 !
WIN
1000
FUNDS
2010
?
```

```
1  TEXT : HOME :Y$ = "Y":N$ = "N"

2  DIM S(15),B(4),F(4),CH(4)
3 NG = 0: GOTO 3000
100  REM  PRINT BETS AND FUNDS AV
AILABLE AND HEADERS FOR THEM

101  POKE 34,16: POKE 35,19
105  VTAB 16: HTAB 1: PRINT "BETS
  ";
106  FOR R = 1 TO PM
107 PS = R * 8
108  VTAB 16: HTAB PS: PRINT B(R)

110  NEXT R
112  VTAB 18: HTAB 1: PRINT "FUND
S ";
114  FOR R = 1 TO PM
115 PS = R * 8
116  VTAB 18: HTAB PS: PRINT F(R)

118  NEXT R
120  RETURN
198  REM  PRINT OUT THE NUMBER FO
R STRIP ST IF VALUE IS NEGAT
IVE THEN STRIP HAS BEEN TURN
ED OVER ALREADY
200  IF S(ST) < 0 THEN 250
201 R =  INT ((ST + 1) / 2)
202 CL = ST - 2 * (R - 1)
203  POKE 34,0: POKE 35,16
204  VTAB R * 2 - 1:PS = 22 * (CL
 - 1): IF PS = 0 THEN PS = 4

205 : HTAB PS: INVERSE : PRINT  ABS
(S(ST))
206  NORMAL : POKE 34,20: POKE 35
,23
207 XP = XP + 1:ERR = 0
208  HOME : VTAB 20
209 S(ST) =  - S(ST)
210  RETURN
211  REM  TEST FOR GAME OPTION, P
RINT MESSAGE FOR LIE (IF NEE
DED)
212  IF W = 1 THEN  RETURN
213  IF ST <  > L THEN  RETURN
214  IF W = 2 THEN 230
216  PRINT "THE VALUE JUST SHOWN
IS NOT A TRUE ONE!"
218  GOSUB 990
230 S(L) =  - TE
234  RETURN
250  PRINT "THAT NUMBER HAS ALREA
DY BEEN SHOWN
252  GOSUB 990
253 ERR = 1
254  RETURN
298  REM  A CHOICE HAS BEEN MADE
BY PLAYER R. IF HE STOPS SET
 HIS CHOICE FLAG.
300  FOR R = 1 TO PM
302  IF CH(R) <  > 0 THEN 320
303  HOME
304  PRINT "DO YOU WISH TO STOP N
OW NO. ";R;: INPUT A$
306  IF A$ <  > Y$ AND A$ <  > N$
 THEN 304
308  IF A$ = N$ THEN 320
310 CH(R) = ST
314 WS = WS + 1
320  NEXT R
330  RETURN
398  REM  TEST FOR WINNERS. BALAN
CE THE PLAYERS' FUNDS
400  FOR R = 1 TO PM
401 PS = R * 8
402 Q = CH(R): IF S(Q) <  > MX THEN
406
403  VTAB 15: HTAB PS: FLASH : PRINT
"WIN"
405 SG = 1: GOTO 410
406  VTAB 15: HTAB PS: INVERSE : PRINT
"LOSE"
407 SG =  - 1
410  VTAB 16: HTAB PS: PRINT B(R)

412 F(R) = F(R) + SG * B(R)
414  VTAB 18: HTAB PS: NORMAL : PRINT
"     ": VTAB 18: HTAB PS: NORMAL
: PRINT F(R)
416 B(R) = 0: NEXT R
420  RETURN
598  REM  BANKING ROUTINE  SET UP
 LOANS AND CLEAR ACCOUNTS
600 R = I: IF F(R) > 0 THEN  RETURN

605  POKE 34,20: POKE 35,23: HOME
: PRINT "YOU'RE OUT OF CASH
NO. ";R: INPUT "DO YOU WISH
TO BORROW SOME? ";A$
606  IF A$ <  > Y$ AND A$ <  > N$
 THEN 605
608  IF A$ = Y$ THEN 620
610 F(R) =  - 1: PRINT "OK! BE SE
EING YOU!"
612  RETURN
620  INPUT "OK, HOW MUCH? (LIMIT
IS $1000) ";F(R)
621  IF F(R) < 0 THEN 621
622  IF F(R) < 1000.01 AND F(R) >
0 THEN  RETURN
624  IF F(R) > 1000 THEN 630
626  INPUT "DO YOU WISH TO QUIT?
";A$
627  IF A$ <  > Y$ AND A$ <  > N$
 THEN 626
628  IF A$ = Y$ THEN 610
630  PRINT "LET'S TRY AGAIN": GOTO
620
650 I = 1
654  IF F(I) <  >  - 1 THEN 664
656  FOR R = I TO PM - 1
658 B(R) = B(R + 1):CH(R) = CH(R +
1):F(R) = F(R + 1)
660  NEXT R
662 PM = PM - 1:PO = PM
664 I = I + 1: IF I > PM THEN  RETURN

670  GOTO 654
698  REM  TAKE BETS  A BET OF 0 (
ZERO) DEALS YOU OUT (HOWEVER
, YOU ARE ASKED TO CONFIRM Y
OUR DESIRE TO QUIT)
700  POKE 34,20: POKE 35,23
705  HOME : VTAB 21
710  PRINT "TIME TO PLACE YOUR BE
TS!"
720  PRINT "HOW MUCH DO YOU WISH
TO WAGER NO. ";I;" ?": INPUT
AZ
721  IF AZ < 0 THEN 720
722  IF AZ > F(I) OR AZ > 1000 THEN
730
723  IF AZ = 0 AND B(I) <  > 0 THEN
 RETURN
724  IF AZ < B(I) THEN 780
725  IF AZ = 0 AND B(I) = 0 THEN
750
726 B(I) = AZ: RETURN
730  PRINT "YOU CAN'T WAGER THAT
MUCH, TURKEY!": PRINT "TRY A
GAIN"
732  GOSUB 990
734  GOTO 720
750  INPUT "DO YOU WISH TO QUIT?"
;A$
751  IF A$ <  > N$ AND A$ <  > Y$
 THEN 750
754  IF A$ = N$ THEN 770
756 F(I) =  - 1
758  RETURN
770  PRINT "YOU MUST PLACE A BET
OR QUIT!"
772  GOTO 720
780  PRINT "YOU CAN'T DECREASE YO
UR BET!"
782  GOSUB 990
784  GOTO 720
990  FOR SS = 1 TO 300: NEXT SS
992  RETURN
996  REM  NOW BEGIN PLAY SET UP O
PTIONS ON LIES  BRANCH TO GE
T NUMBER OF PLAYERS
1000 PO = 0
1001  TEXT : HOME
1005 NG = 1
1010  VTAB 2: HTAB 14: PRINT "GAM
E OPTIONS"
1012  VTAB 6: PRINT " 1";: HTAB 5
: PRINT "STRAIGHT UP GAME (I
 DON'T LIE)"
1014  VTAB 8: PRINT " 2";: HTAB 5
: PRINT "'RUSSIAN ROULETTE'(
I LIE TO YOU)"
1016  VTAB 10: PRINT " 3";: HTAB
5: PRINT "LIKE NO. 2, BUT I
TELL YOU WHEN": VTAB 11: HTAB
7: PRINT " I AM DEALING A BO
GUS NUMBER"
1020  VTAB 18: PRINT "IF THIS ISN
'T CLEAR,SEE THE INSTRUCTION
S"
1022  VTAB 21: INPUT "WHICH? ";W
1024  IF W > 3 OR W < 1 THEN 1022

1026  HOME : GOTO 1100
1030  POKE 34,0: POKE 35,16: HOME

1032  VTAB 2: PRINT "  HOW MANY S
LIPS OF PAPER DO YOU WISH TO
  PICK FROM? (MAX = 14)"
1033  VTAB 5: INPUT NP: IF NP < 2
 OR NP > 14 THEN 1033
1040 Z =  RND (1):MX =  - 1:IM =
15
1042  FOR I = 1 TO NP:X =  RND (2
)
1044 Y =  INT (38 *  RND (3) *  RND
(4)):S(I) = X * (10 ^ Y)
1045  IF S(I) < MX THEN 1047
1046 IM = I:MX = S(I)
1047  NEXT I
```

SIMUTEK PRESENTS

★ TRS-80 ★

……………………GAMES……………………

!!! WHOLESALE !!!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ PACKAGE ONE ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

GRAPHIC-TREK "2000" — This full graphics, real time game is full of fast, exciting action! Exploding photon torpedoes and phasers fill the screen! You must actually navigate the enterprise to dock with the giant space stations as well as to avoid klingon torpedoes! Has shields, galactic memory readout, damage reports, long range sensors, etc! Has 3 levels for beginning, average, or expert players! ★ **INVASION WORG** — Time: 3099, Place: Earth's Solar System Mission: As general of Earth's forces, your job is to stop the Worg invasion and destroy their outposts on Mars, Venus, Saturn, Neptune, etc! Earth's Forces: Androids — Space Fighters — Lazer Cannon — Neutrino Blasters! Worg Forces: Robots — Saucers — Disintegrators — Proton Destroyers! Multi level game lets you advance to a more complicated game as you get better! ★ **STAR WARS** — Manuever your space fighter deep into the nucleus of the Death Star! Drop your bomb, then escape via the only exit. This graphics game is really fun! May the Force be with you! ★ **SPACE TARGET** — Shoot at enemy Ships with your missiles. If they eject in a parachute, capture them — or if you're cruel, destroy them! Full graphics, real time game! ★ **SAUCERS** — This fast action graphics game has a time limit! Can you be the commander to win the distinguished cross! Requires split second timing to win! Watch out!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ PACKAGE TWO ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

CHECKERS 2.1 — Finally! A checkers program that will challenge everyone! Expert as well as amateur! Uses 3-ply tree search to find best possible move. Picks randomly between equal moves to assure you of never having identical games. ★ **POKER FACE** — The computer uses psychology as well as logic to try and beat you at poker. Cards are displayed using TRS-80's full graphics. Computer raises, calls, and sometimes even folds! Great practice for your Saturday night poker match! (Plays 5 card draw). ★ **PSYCHIC** — Tell the computer a little about yourself and he'll predict things about you, you won't believe! A real mind bender! Great amusement for parties. ★ **TANGLE MANIA** — Try and force your opponent into an immobile position. But watch out, they're doing the same to you! This graphics game is for 2 people and has been used to end stupid arguments. (And occasionally starts them!) ★ **WORD SCRAMBLE** — This game is for two or more people. One person inputs a word to the computer while the others look away. The computer scrambles the word, then keeps track of wrong guesses.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ PACKAGE THREE ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

POETRY — This program lets you choose the subject as well as the mood of the poem you want. You give TRS-80 certain nouns or names, then the mood, and it does the rest! It has a 1000-word + vocabulary of nouns, verbs, adjectives and adverbs! ★ **ELECTRIC ARTIST** — Manual: draw, erase, move as well as, Auto: draw, erase and move. Uses graphics bits not bytes. Saves drawing on tape or disk! ★ **GALACTIC BATTLE** — The Swineus enemy have long range phasers but cannot travel at warp speed! You can, but only have short range phasers! Can you blitzkrieg the enemy without getting destroyed! Full graphics — real time! ★ **WORD MANIA** — Can you guess the computer's words using your human intuitive and logical abilities? You'll need to, to beat the computer! ★ **AIR COMMAND** — Battle the Kamikaze pilots. Requires split second timing. This is a FAST action arcade game.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★PACKAGE FOUR ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

LIFE — This Z-80 machine language program uses full graphics! Over 100 generations per minute make it truly animated! You make your starting pattern, the computer does the rest! Program can be stopped and changes made! Watch it grow! ★ **SPACE LANDER** — This full graphics simulator lets you pick what planet, asteroid or moon you wish to land on! Has 3 skill levels that make it fun for everyone. ★ **GREED II** — Multi-level game is fun and challenging! Beat the computer at this dice game using your knowledge of odds and luck! Computer keeps track of his winnings and yours. Quick fast action. This game is not easy! ★ **THE PHARAOH** — Rule the ancient city of Alexandria! Buy or sell land. Keep your people from revolting! Stop the rampaging rats. Requires a true political personality to become good! ★ **ROBOT HUNTER** — A group of renegade robots have escaped and are spotted in an old ghost town on Mars! Your job as "Robot Hunter" is to destroy the pirate machines before they kill any more settlers! Exciting! Challenging! Full graphics!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★PACKAGE FIVE ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

SUPER HORSERACE — Make your bets just like at the real racetrack! 8 horses race in this spectacular graphic display! Up to 9 people can play! Uses real odds but has that element of chance you see in real life! Keeps track of everyone's winnings and losses. This is one of the few computer simulations that can actually get a room of people cheering! ★ **MAZE MOUSE** — The mouse with a mind! The computer generates random mazes of whatever size you specify, then searches for a way out! The second time, he'll always go fastest route! A true display of artificial intelligence! Full graphics, mazes & mouses! ★ **AMOEBA KILLER** — You command a one man submarine that has been shrunken to the size of bacteria in this exciting graphic adventure! Injected into the president's bloodstream, your mission is to destroy the deadly amoeba infection ravaging his body! ★ **LOGIC** — This popular game is based on Mastermind but utilizes tactics that make it more exciting and challenging — has 2 levels of play to make it fun for everyone. ★ **SUBMARINER** — Shoot torpedoes at the enemy ships to get points. Fast action graphics, arcade type game is exciting and fun for everybody!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ PACKAGE SIX ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

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★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ PACKAGE SEVEN ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

BACKGAMMON 5.0 — 2 different skill levels make this game a challenge to average or advanced players. (Not recommended for beginners). Looks for best possible move to beat you! FANTASTIC GRAPHICS. Plays doubles and uses international rules. ★ **SPEED READING** — Increases your reading speed. Also checks for comprehension of material. Great for teenagers and adults to improve reading skills. ★ **PT 109** — Drop depth charges on moving subs. Lower depths get higher points in this fast action graphics game. ★ **YAHTZEE** — Play Yahtzee with the computer. This popular game is even more fun and challenging against a TRS-80! ★ **WALL STREET** — Can you turn your $50,000 into a million dollars? That's the object of this great game. Simulates an actual stock market!

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CIRCLE 215 ON READER SERVICE CARD

```
1048  IF W = 1 THEN  RETURN
1050 L =  RND (4): IF L < .1 THEN
1050
1052 L = 100 * L:ZZ =  INT ((L /
NP -  INT (L / NP)) * NP + .
05):L = ZZ
1054 TE = S(L):X =  RND (2):Y =  INT
(38 *  RND (5) *  RND (6))
1056 S(L) = X * (10 ^ Y)
1060  RETURN
1098  REM  GET THE NUMBER OF PLAY
ERS
1099  REM  THEN INITIALIZE FUNDS.
 THEN HOW MANY STRIPS, THEN
TAKE BETS (CONVOLUTED, BUT I
T WORKS)
1100  VTAB 10: INPUT "HOW MANY PL
AYERS? (1 TO 4) ";PM
1101  IF PM < 1 OR PM > 4 THEN 11
00
1102  IF PM = PO THEN 1111
1103  IF PO = 0 THEN 1109
1104  FOR I = PM TO PO: GOSUB 600
: NEXT I
1106 PO = PM: GOTO 1111
1109 PO = PM
1110  FOR I = 1 TO PM: GOSUB 600:
 NEXT I
1111  GOSUB 650: GOSUB 1030: GOSUB
100
1112  FOR I = 1 TO PM: GOSUB 700:
 NEXT I
1115  GOSUB 650
1119  REM  INITIALIZE CHOICE MEMO
RY
1120  FOR I = 1 TO PM:CH(I) = 0: NEXT
I
1130 WS = 0
1198  REM  THIS SECTION PRINTS OU
T THE DISPLAY FOR APPLE VIDE
O. STRIPS ARE WHITE BLOCKS (
INVERSE BLANKS)
1200  TEXT : HOME
1202 N = 0:PP = 0
1204  FOR J = 1 TO 14 STEP 2
1206  VTAB J: HTAB 1: FOR K = 1 TO
2
1207  NORMAL : PRINT "  ";: INVERSE
: PRINT "                  ";
1208 N = N + 1: IF N = NP THEN 12
10
1209  NEXT K
1210 PQ = J + 1: FOR K = J TO PQ:
 VTAB J:PS = 38 * (K - J)
1212  IF PS = 0 THEN PS = 1
1214  NORMAL : HTAB PS: PRINT K: IF
K = NP THEN 1220
1216  NEXT K
1218  NEXT J
1220  NORMAL
1222  POKE 34,17: POKE 35,19
1229  REM  DISPLAY BETS AND TOTAL
S
1230  GOSUB 100
1250  POKE 34,20: POKE 35,23
1252  HOME : VTAB 21
1254  PRINT "WHICH STRIP DO YOU W
ISH TO SEE";: INPUT ST
1255  IF ST > NP THEN 1252
1256  GOSUB 200: IF XP = NP THEN
1290
1257  IF ERR = 1 THEN 1252
1258  GOSUB 300
1260  IF WS = PM THEN 1300
1261  REM  WS=PM MEANS ALL PLAYER
S HAVE CHOSEN
1265  GOSUB 212
1269  REM  CHANGE BETS?
1270  FOR I = 1 TO PM
1272  GOSUB 700
1275  NEXT I
1277  GOSUB 650
1280  GOTO 1230
1288  REM  OKAY ALL STRIPS HAVE B
EEN SHOWN. IF NO CHOICE HAS
BEEN MADE, THEN THE CHOICE M
UST BE THE REMAINING STRIP
1290  FOR I = 1 TO PM: IF CH(I) <
 > 0 THEN 1296
1292 CH(I) = ST
1296  NEXT I
1298  REM  ALL BETS ARE IN, PRINT
 OUT THE REAL VALUES FOR ALL
 THE STRIPS, FLASH THE LARGE
ST
1300  POKE 34,20: POKE 35,23: HOME

1301  VTAB 20
1302  PRINT "ALL BETS ARE NOW IN"

1303  GOSUB 230
1304  POKE 34,0: POKE 35,15
1306  FOR ST = 1 TO NP
1308  GOSUB 201
1309 S(ST) =  ABS (S(ST))
1310  IF S(ST) <  > MX THEN 1320
1312  VTAB R * 2 - 1:PS = 22 * (C
L - 1): IF PS = 0 THEN PS =
4
1314  HTAB PS: FLASH : PRINT S(ST
)
1320  NEXT ST
1330 : POKE 34,20: POKE 35,23
1331  HOME : VTAB 20
1332  PRINT "THE CORRECT NUMBER W
AS ";MX;" !"
1339  REM  SETTLE THE BETS
1340  GOSUB 400
1342 XP = 0
1345  PRINT H$;: INPUT A$
1350  TEXT : HOME
1354  VTAB 10: INPUT "DO YOU WISH
 TO CHANGE GAME OPTION?";A$
1356  IF A$ <  > N$ AND A$ <  > Y
$ THEN 1354
1358  IF A$ = Y$ THEN 1005
1360  VTAB 12: INPUT "DO YOU WANT
 TO CHANGE THE NUMBER OF PLA
YERS?";A$
1362  IF A$ <  > N$ AND A$ <  > Y
$ THEN 1360
1364  IF A$ = Y$ THEN 1100
1366  HOME
1368  GOSUB 100
1370  GOTO 1111
1372  REM
1374  REM  LOOP THROUGH THE PROGR
AM
1376  REM
1400  REM  PRINT HEADER FOR PROGR
AM, ASK IF INSTRUCTIONS ARE
NEEDED
1500  REM
3000  VTAB 8: HTAB 17: PRINT "10^
38": VTAB 10: HTAB 8: PRINT
"(TEN TO THE THIRTY-EIGHTH)"
: VTAB 12: HTAB 5: PRINT "A
BETTING GAME FOR THE APPLE I
I"
3002  VTAB 16: HTAB 6: PRINT "PRO
GRAMMED BY L. W. BRADFORD"
3004  VTAB 22: INPUT "DO YOU WANT
 INSTRUCTIONS? (Y/N)";A$
3005  IF A$ <  > Y$ AND A$ <  > N
$ THEN 3006
3006  IF A$ = N$ THEN 1000
4000  TEXT : HOME
4001 H$ = "HIT RETURN TO CONTINUE
"
4002  PRINT "10^38 IS BASED ON 'G
OOGOL', A GAME THAT IS DESCR
IBED BY MARTIN GARDNER IN HI
S   BOOK 'NEW MATHEMATICAL D
IVERSIONS FROM  SCIENTIFIC A
MERICAN'."
4003  PRINT : PRINT
4004  PRINT "THE GAME WAS ORIGINA
TED BY JOHN H. FOX  AND L. G
ERALD MARNIE, IN 1958."
4005  PRINT
4006  PRINT : PRINT "THE GAME DES
CRIBED HERE IS ESSENTIALLY
THE SAME, BUT WITH SOME 'TWI
STS' TO IT."
4008  PRINT : PRINT "A GOOGOL IS
10 MULTIPLIED BY ITSELF 100
TIMES.  THE ORIGINAL GAME HA
D THAT       VALUE AS AN UPPE
R LIMIT."
4009  PRINT "THE LIMIT FOR THIS G
AME IS 10^38, WHICH EXPLAINS
 THE NAME"
4010  VTAB 22: PRINT H$;: INPUT A
$
4020  HOME : PRINT "THE BASIC GAM
E IS PLAYED AS FOLLOWS;": PRINT
"THE PROGRAM PICKS SOME RAND
OM POSITIVE"
4022  PRINT "NUMBERS (FROM 0 TO A
BOUT 10^38).": PRINT "THE NU
MBERS ARE WRITTEN ON THE BAC
K OF": PRINT "SOME STRIPS OF
 PAPER."
4023  PRINT
4024  PRINT : PRINT "THE NUMBER O
F STRIPS OF PAPER TO BE USED
 IS UP TO YOU.": PRINT "BUT
YOU MUST CHOOSE AT LEAST 3 A
ND NOT  MORE THAN 14."
4026  PRINT : PRINT "WHEN YOU SEL
ECT A STRIP, IT WILL BE
'TURNED OVER' TO DISPLAY THE
 NUMBER."
4028  VTAB 22: PRINT H$;: INPUT A
$
4040  HOME : PRINT "THE GAME IS P
LAYED BY TURNING THE STRIPS
OVER ONE AT A TIME";: PRINT
" UNTIL YOU COME"
4042  PRINT "TO THE STRIP WHICH Y
OU GUESS TO BE THE   LARGEST
 OF THE BUNCH."
4044  PRINT : PRINT "YOU MUST TAK
E THE LAST STRIP YOU TURNED
 OVER, YOU CAN'T GO BACK TO
ANOTHER."
4046  PRINT "FROM ONE TO FOUR PEO
PLE MAY PLAY AT ANY  ONE TIM
E.": PRINT : PRINT "PLAYERS
MAKE BETSON THEIR OWN CHOICE
S."
4048  PRINT "IF A PLAYER MAKES A
CHOICE,THE OTHERS   MAY CONT
INUE SEARCHING.": PRINT "BET
TING CONTINUES UNTIL ALL PLA
YERS      HAVE CHOSEN"
4050  PRINT : PRINT "TO HOLD AT A
 PARTICULAR BET, ENTER A
ZERO FOR THE BET.": PRINT "Y
OU MUST,HOWEVER, MAKE SOME B
ET OF AT"
4052  PRINT "LEAST $1.00"
4058  VTAB 22: PRINT H$;: INPUT A
$
4060  HOME : VTAB 2: PRINT "TO TH
ROW A LITTLE CONFUSION INTO
MATTERS TTHE COMPUTER CAN LI
E TO YOU."
4062  PRINT : PRINT "TWO OPTIONS
ARE PROVIDED TO THE BASIC  G
AME.": PRINT "IN THE FIRST O
PTION, THE COMPUTER WON'T TE
LL YOU"
4064  PRINT : PRINT "THE SECOND O
PTION IS NOT FOR THE FAINT
OF HEART.": PRINT "THE COMPU
TER WILL TELL YOU IF IT HAS
    LIED ABOUT THE LAST NUMB
ER."
4066  PRINT : PRINT "SO, IF YOU'V
E JUST BET ON IT, YOU MAY
LOSE OR YOU MAY WIN BUT YOU
WON'T BE    SURE"
4068  PRINT "BUT THEN NEITHER WIL
L ANYBODY ELSE."
4070  VTAB 22: PRINT H$;: INPUT A
$
4072  HOME : VTAB 3: PRINT "THE R
EAL CHALLENGE OF THE GAME IS
 TO    FIND A WAY TO OPTIMIZ
E YOUR  BETTING."
4074  PRINT : PRINT "MARTIN GARDN
ER DISCUSSES THE STRATEGY
FOR THE NORMAL GAME IN HIS B
OOK,"
4076  PRINT : PRINT "   'NEW MATH
EMATICAL DIVERSIONS FROM": PRINT
"        SCIENTIFIC AMERICAN"

4078  PRINT : PRINT "THE ANALYSIS
 OF THE SITUATIONS WHERE THE
 COMPUTER LIES TO YOU IS LEF
T TO THE    INTERESTED READE
R."
4080  VTAB 20: INPUT "HIT RETURN
TO START PLAY";A$
9000  TEXT : HOME
9100  GOTO 1000
9999  END
```

YORN

David Gerrold

So there I was, showing off my North Star to some friends who were thinking about getting a machine of their own, and suddenly, the attractive redhead asked, "If it's so smart, how come I have to type in a '1' or a '2' for 'yes' or 'no'?"

"Um — " I said. "That's just the way the program was written. I copied it out of **Creative Computing.** The author was probably trying to save memory, so he didn't bother putting in a recognition subroutine."

"But it's possible?" she asked.

"Sure," I said. "It's probably very easy. In fact, they encourage you to personalize the programs to your own uses."

"So, why haven't you?" she asked.

She had me there. I said, "Because I hadn't recognized a need to . . . ?"

"Well, it would be nice," she sniffed. And I knew what that sniff meant.

All right. I'd show her.

After they left, I sat down at the machine and constructed the following all-purpose "Y" or "N" subroutine to patch into various game programs.

I call it Yorn, and it's written in North Star Basic.

Whenever a "yorn" is needed, have your program print the question, then jump to the Yorn subroutine. It will then return a 1 or a -1.

The subroutine will recognize any variation of yes or no that begins with the same letters: **Yeah** or **Yup** or **Nein** or **Nyet.** For some reason, this impresses people who don't realize exactly what the program is recognizing.

I chose to use the positive and negative values, because it appeals to my sense of symmetry. Also, the value can be inverted by multiplying by -1. This could be convenient for some applications.

If the user puts in anything but a yes-or-no answer, the subroutine prompts him (line 1100) to answer properly and then starts over. You can't get out of the subroutine unless you answer with a yes or a no.

If you want to be more versatile, you can add:

1085 DATA "AFFIRM",1,"ALL RIGHT",1,"SURE",1,"OK",1

— or any other affirmatives or negatives, you want recognized.

My redheaded friend was suitably impressed when Yorn responded to her "Yassuh" and her "Naw" — but then, she looked up at me and asked, "How come it always prints out at the edge of the page? Can't you center it?"

But that's another subroutine. □

David Gerrold, P.O. Box 1190, Hollywood, CA 90028.

```
1010REM ------------------------------YORN
1020INPUT I$
1030RESTORE 1080
1040READ A$,Z\IF A$="ZZZ" THEN 1060\A=LEN(A$)
1050IF I$(1,A)<>A$ THEN 1040
1060ON ABS(Z) GOTO 1070,1100
1070RETURN
1080DATA"Y",1,"y",1,"N",-1,"n",-1
1090DATA"ZZZ",2
1100PRINT"'Yes' or 'no', please."
1110GOTO1020
READY
```

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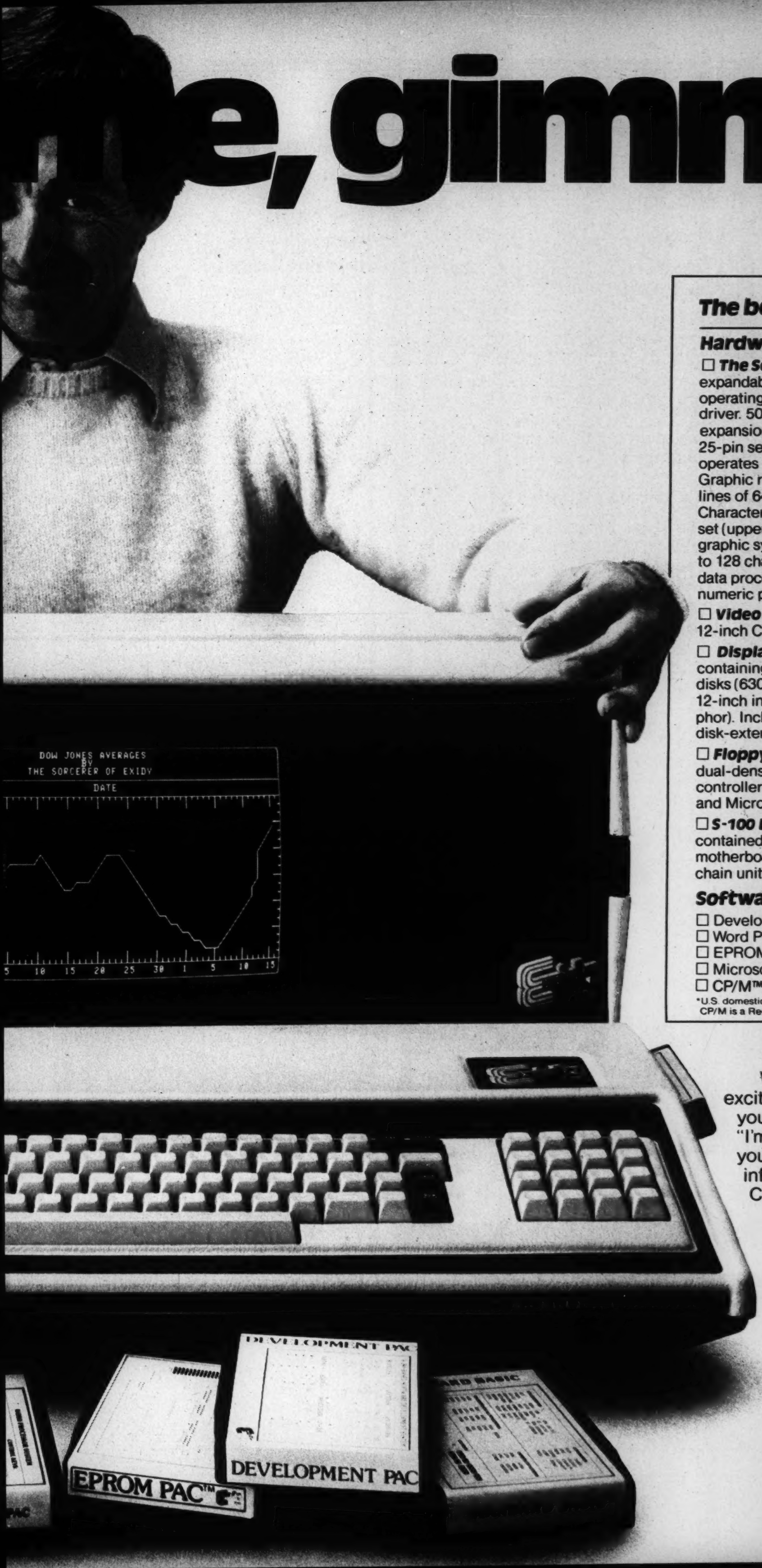

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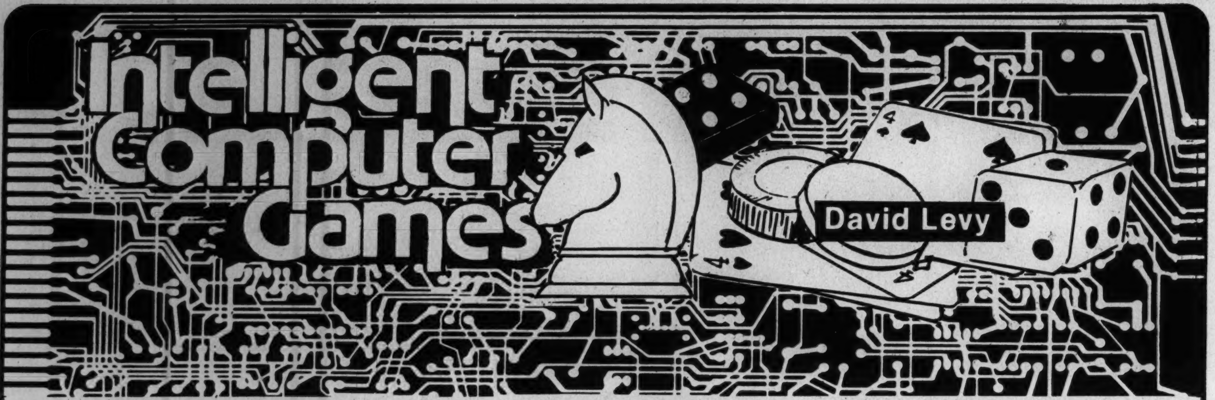

Intelligent Computer Games

David Levy

Correspondence is welcome. Letters with interesting questions and ideas will be used in the column along with a response. No personal replies can be made. Send to: David Levy, 104 Hamilton Terrace, London NW8 9UP, England

Games with Big Trees

Last month we discussed the use of the minimax method to search game trees, using noughts and crosses (tic-tac-toe) as our example. This is a game with sufficient symmetry to reduce the number of essentially different moves at the start to three: the center, a corner, or the middle of an edge. At the second ply there are a total of 12 essentially different positions, so with only seven spaces then remaining there will be an upper bound of 12 x 7 on the total number of terminal positions in the whole of the game tree. In practice the total will be somewhat less than this figure, since a number of paths will lead to a win for one side or the other, or a draw (i.e. a position in which every row, column and diagonal has at least one "O" and one "X" in it), before all nine elements of the 3 × 3 array have been filled. In order to play a perfect game of noughts and crosses with the crudest of evaluation functions, we could search the game tree exhaustively, using a score of +1 for a variation won by the program, −1 for a variation won by the opponent, and 0 for a draw.

Most interesting two-person games have much larger trees than this: in chess there are roughly one million terminal positions in an average 4-ply search, in Go the figure would be ten thousand million for a 4-ply search at the start of the game. How can we cope with such gigantic combinatorial growth in our game trees? The answer lies in a refinement of the minimax method known as the alpha-beta algorithm.

The Alpha-Beta Algorithm

The alpha-beta algorithm owes its power to the argument that if a player can choose from a number of moves, once he finds one move which serves his purpose he need not examine the remainder of the moves in that group. Let us look at a simple two-person game tree to illustrate this point.

(See Figure 1)

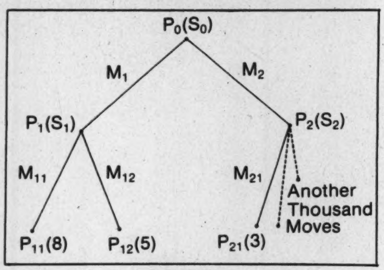
$P_0(S_0)$
M_1
M_2
$P_1(S_1)$
$P_2(S_2)$
M_{11}
M_{12}
M_{21}
Another Thousand Moves
$P_{11}(8)$
$P_{12}(5)$
$P_{21}(3)$

FIGURE 1.

We shall assume that a program searches the above tree from left to right, and that the evaluation function assigns scores of 8, 5 and 3 respectively to the terminal nodes P_{11}, P_{12} and P_{21}. If the program is to move from position P_0, it first considers move m_1 and then tries to decide what its opponent will do from position P_1. The opponent may choose between scores of 8 and 5, and since we have adopted the convention that the opponent's target is a low score, the opponent will choose position P_{12} with a score of 5.

The program now knows that if it chooses m_1, its opponent can prevent it from achieving a score of more than 5. This value of 5 is therefore the value

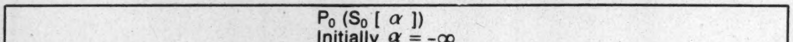
P_0 (S_0 [α])
Initially $\alpha = -\infty$
M_1
M_2
P_1 (S_1 [β])
Initially $\beta = +\infty$
P_2 (S_2 [β])
Initially $\beta = +\infty$
M_{11}
M_{12}
M_{21}
M_{22}
P_{11} (S_{11} [α])
Initially $\alpha = -\infty$
P_{12} (S_{12} [α])
Initially $\alpha = -\infty$
P_{21} (S_{21} [α])
Initially $\alpha = -\infty$
P_{22} (S_{22} [α])
Initially $\alpha = -\infty$
M_{111}
M_{112}
M_{121}
M_{122}
M_{211}
M_{212}
M_{221}
M_{222}
$P_{111}(8)$
$P_{112}(7)$
$P_{121}(9)$
$P_{122}(5)$
$P_{211}(3)$
$P_{212}(2)$
$P_{221}(2)$
$P_{222}(1)$

FIGURE 2.

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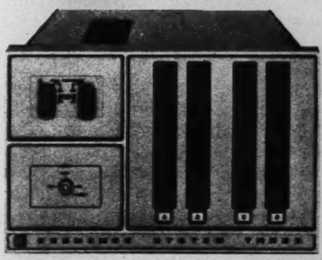

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2248 Broadway, New York, N.Y. 10024 (212) 580-0052 Telex 220501 of position P_1, assuming correct play by the opponent, and so the value 5 is assigned to S_1. We call this process of assigning values as the program backtracks up the tree "backing-up."

The score at S_1 is now backed up to S_0 and the program then considers position P_2, to determine whether it will prefer to play move m_1 or m_2. It sees that from position P_2 its opponent can, if he wishes, move to P_{21} for a score of 3, and since 3 is better than 5 from the opponent's point of view, the program will wish to deny its opponent this option and it will not, therefore, choose move m_2. It is completely irrelevant what the scores are for the thousands of unexamined brother nodes, $P_{2,2}, P_{2,3}, \ldots P_{2,1001}$, because the move m_{21} is already known to refute m_2. Thus the program has determined that m_1 is better than m_2, even though it has examined only 3 of the 1,002 terminal nodes on the tree!

Of course this particular example has been specifically designed to sell you the alpha-beta algorithm, and most game trees do not allow us to get away so lightly, but the savings achieved with this algorithm are certainly substantial enough to make alpha-beta an almost essential segment in any program that searches two person-game trees. The algorithm always chooses the same move that would be selected by the minimax algorithm, but usually in a fraction of the time.

Since alpha-beta is so important in game playing, I make no apologies for including another, more complex example. This will show how the method works for a 3-ply tree and will illustrate why it has been given its strange name.

(See Figure 2)

Initially, all non-terminal nodes at even ply are assigned the value $-\infty$ (α). All non-terminal nodes at odd ply are assigned the value $+\infty$ (β). As usual it is the program's turn to move from the root position P_0, and the program is trying to maximize the value of α. The opponent moves from positions P_1 and P_2, trying to minimize the value of β. The program moves from the positions at ply-2 (P_{11}, P_{12}, P_{21} and P_{22}), trying to maximize α.

The tree search now proceeds as follows:

1. Examine P_{111}. The score of 8 is greater than $-\infty$ so α at S_{11} is set to 8. This score is then compared with β at S_1 and found to be less than $+\infty$, so this value of β is also set to 8. In order to decide whether the program might be willing to play m_1, this score of 8 at S_1 is compared with $-\infty$ at S_0 and found to be greater, so α at S_0 is set to 8.

2. Examine P_{112}. The score of 7 is less than α at S_{11}, which is now 8, and since it is intended to maximize α, the value of α at S_{11} is not adjusted, and therefore the value of β at S_1 and that of α at S_0 also remain unchanged.

3. Examine P_{121}. The score of 9 is greater than $-\infty$, so α at S_{12} is set to 9. This score is then compared with β at S_1 and found to be greater, and since it is intended to minimize β the program can reject move m_{12}, knowing that its opponent can do better with move m_{11}.

4. The left hand side of the tree has now been examined and the search proceeds to the comparison of the best score achieved so far (8) with whatever can be reached, assuming best play by both sides, if the program should choose m_2. This part of the search commences with an examination of P_{211}, which is found to have a score of 3. This is compared with α at S_{21} and found to be greater, and since it is intended to maximize α the program will set this value of α to 3.

5. Examine P_{212}. The score of 2 is less than 3, so α at S_{21} (currently 3) is left unchanged, since it is intended to maximize α. This score of 3 is then compared with β at S_2, found to be lower, and since it is intended to minimize β this value of β at S_2 is set to 3. Finally this value of 3 is compared with α at S_0 (currently 8) and found to be lower. Since it is intended to maximize α, the program already knows that m_2 is inferior to m_1, because playing m_2 is not consistent with maximizing α.

The search is now over and it can be seen that only five of the eight terminal nodes needed to be examined. If you wish to verify the validity of this process by practical means, try assigning different sets of values to positions P_{122}, P_{221} and P_{222}, and you will always find that the program prefers move m_1 to move m_2.

How Powerful Is the Alpha-Beta Algorithm?

During the past few years there has been considerable research into the question of just how big are the savings achieved using this algorithm rather than simple minimax. A full discussion of the theoretical and practical results of this research is well beyond the scope of this series, but the studious reader will find this work well documented in the bibliographic references found at the conclusion of this article. What follows is a summary of the most important results, and a brief discussion of their significance.

Monroe Newborn has investigated the power of the alpha-beta algorithm when searching game trees in which the moves within any group are examined in a random order. The following table shows, for various branching factors (b), the number of terminal nodes which we would expect a program to examine, using alpha-beta, in searches of 2 and 3-ply.

	2-ply search		3-ply search	
b	total terminal nodes	expectation	total terminal nodes	expectation
2	4	3.67	8	6.84
4	16	12.14	64	40.11
8	64	38.65	512	220.37
16	256	122.11	4096	1214.45

TABLE 1.

It will be seen that as the branching factor increases, so the proportion of nodes that can be ignored thanks to the alpha-beta algorithm also increases. And as the depth of search increases the effect of the algorithm is again increased. So the bigger the tree becomes, the greater will be the savings using the alpha-beta method.

The savings become even more dramatic when the branches of the tree are examined in an intelligent order. In general it is true to say that within any group of moves the best one should be examined first, so that if the best one is not good enough we need not waste time in examining the second best, third best and inferior moves. If the tree is searched in such a way that the moves are examined in their optimal order, then the number of terminal nodes examined will be approximately 2 × $\sqrt{N}$, where N is the total number of terminal nodes on the tree. Thus, for a game of chess in which the branching factor is typically 36, the number of terminal nodes on the tree is 36^4 for a 4-ply tree. Yet by using the alpha-beta algorithm, if the tree is optimally ordered we need examine only 2×36^2 terminal nodes before we find the best move from the root of the tree, a saving of well over 99% when compared with the simple minimax method.

Taking the figures from Newborn's results quoted above, we can compare the expected number of nodes examined with random ordering and the number of nodes examined with optimal ordering.

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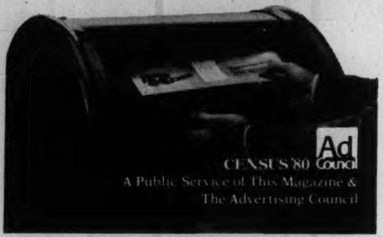

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	2-ply search		3-ply search	
b	random	optimal*	random	optimal*
2	3.67	3	6.84	5.66
4	12.14	7	40.11	15
8	38.65	15	220.37	44.248
16	122.11	31	1214.45	127

TABLE 2.

I hope that the reader is now convinced that for all two-person game trees, except the smallest of the small, alpha-beta is a must. The most important implication of these results is that if it is at all possible, you should generate and/or examine the moves within any group or family in such a way as to take maximum advantage of the savings that can be achieved, and this means ordering the search in some way. We shall discuss various techniques for speeding up the alpha-beta search in our next month's article, but one obvious method can be mentioned here. First, generate all the moves at the root of the tree, m_1 m_2 . . . etc., and evaluate the resulting positions with the evaluation function. Sort the moves so that the move with the highest score will be examined first, then the move with the next highest, and so on.

Next look at the first position on the list and generate its successor positions. These are assigned scores using the evaluation function and they are then sorted, this time with the lowest scored position coming at the top of the list and the highest scored position at the bottom. (This is because the program's opponent is trying to minimize the score.)

This process is repeated all the way down the tree, except for the terminal nodes, which are not sorted. Now, when searching the tree with the alpha-beta algorithm, the tree will be found to be much nearer an optimally sorted tree than if this process had not been applied. One disadvantage of this method, however, is that it requires us to keep in memory all the successor nodes to each node on the principal variation, apart from the terminal nodes. So in a search of a chess tree, with 36 moves at each node, this method would require us to keep in memory:

a) the root node

b) 36 nodes at each level of look-ahead apart from the terminal node.

In order to combat this problem we might try to find an extremely compact method of representing a position, but if this compactness results in a slowing down of the search process while each position is unravelled or created, much of the effect of the fast alpha-beta algorithm will be lost. Such problems require careful thought and it is often necessary to experiment before the best balance is achieved between representation and optimality of search.

Other useful techniques for examining the moves in a sensible order can often be found by thinking a little about the nature of the game. Let us consider once again the game of noughts and crosses. The elements of the 3 × 3 array might be numbered as in the following diagram:

```
1   2   3
4   5   6
7   8   9
```

A simple way to generate all the legal moves from any position is to look at the elements, starting with 1 and working up to 9, and putting any empty space on the move list. But with a basic knowledge of the strategy of the game we can speed up the search process by looking first at element 5, then 1, 3, 7 and 9, and finally at 2, 4, 6 and 8. This method of move generation takes no longer than 1, 2, 3, 4, . . . 9, yet it enables the alpha-beta algorithm to examine the moves in a more sensible order, thereby taking us closer to an optimal search process.

Next month we shall examine a flow-chart for the alpha-beta algorithm and look at further ideas for speeding up the search process.

Task for the Month

Write a program to play noughts and crosses (tic-tac-toe), taking advantage of symmetry and employing the alpha-beta algorithm. Search the whole game tree using the primitive evaluation function described above (+1 is a win for the program, −1 a win for the opponent and 0 a draw).

Test the program a) when the moves are generated in a random order; and b) when the moves are generated in the order: centre, corners, middle of edges. The results should indicate a useful improvement with ordered search over random search.

Bibliography

Knuth, D.E., and Moore, R.W.: *An Analysis of Alpha-Beta Pruning.* Artificial Intelligence, vol. 6, pp. 293-326, 1975.

Newborn, M.M.: *The Efficiency of the Alpha-Beta Search on Trees with Branch-dependent Terminal Node Scores.* Artificial Intelligence, vol. 8, pp. 137-153, 1977.

Acknowledgement

This program was written on an Apple II computer which was purchased through Grant A0260 from the National Science and Engineering Council of America.

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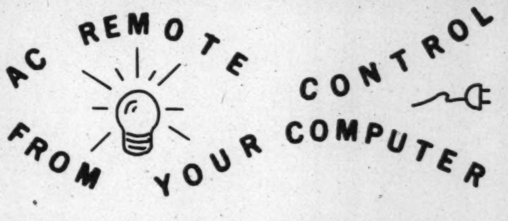

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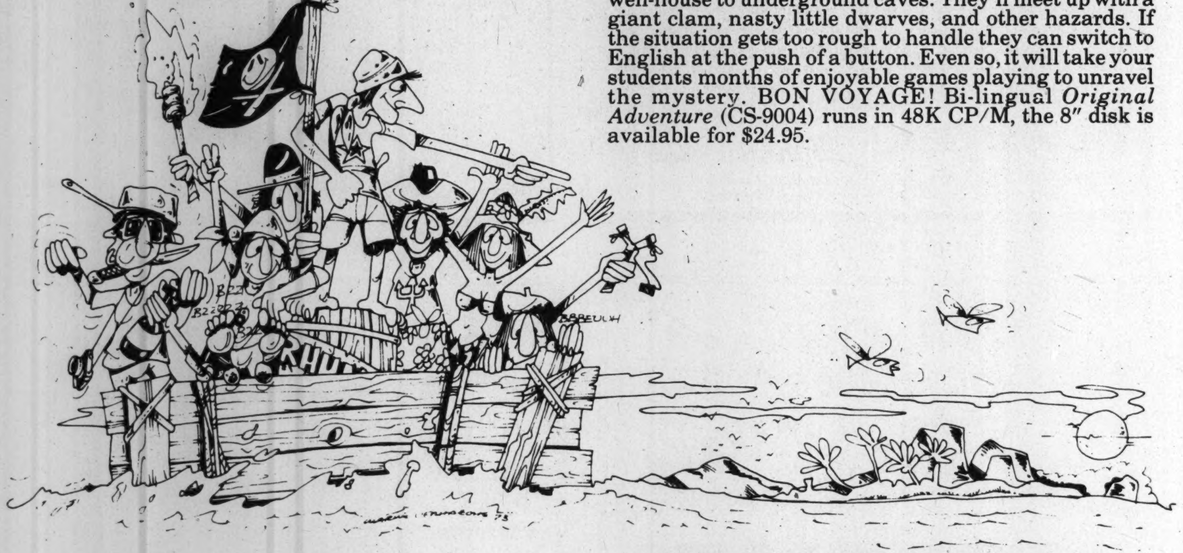

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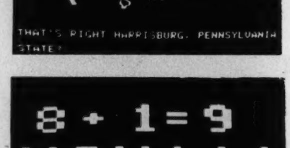
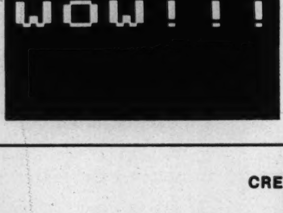


```
THAT'S RIGHT HARRISBURG, PENNSYLVANIA
STATE?
```

U.S. Map



```
8 + 1 = 9
WOW ! ! !
```

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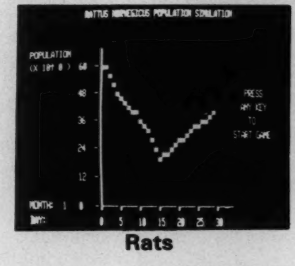
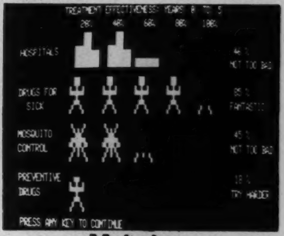


Rats



Malaria

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Apple~Cart

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Simple File Builder

One of the most useful features associated with the Apple II DOS is the use of files. Files can include anything from a matrix of data as a result of mathematical calculations to a sophisticated Data Base Management System. Listing 1 is an example of a simple file builder and manager. Random access, fixed length files, are used in this example. At this level, sequential files, of fixed length, would have been just as easy to implement. But that's not part of this story.

Most of the elements required to manage a file system are used in this example. Here's what has been included:

- Initialization Routines
- Error Detection Routine
- An Operating System Section
- Building New Files
- Adding New Records
- List Records with Suspension
- Keyword Search
- Record Editing

The initializing and error detecting sections are transparent to the user. The others are included in the operating section as menu options. Other menu selections could include printer selection and control, and sorting. We'll leave these for the future. Let's examine each section of the Simple File Builder and see what it's all about.

Initialize

After clearing the screen with HOME, the program is directed to line 2720 if an error occurs. In one part of the program an error is forced, and used to change the flow of the program. Otherwise, if an error occurs, the program returns to the options menu. If you use control C the effect is the same as an error. The forced error, #5 in line 2720, is an out-of-data error. When a new file is named and you try to read it, this error occurs. There are no records to read. The error is trapped and the program directs you to the Build New Records option. More on this when we get to the Operating System. Other tasks handled in the initialization routine are setting up the control D required to identify DOS commands, dimensioning the number of records (R$) and setting the initial count of the record counter (C).

Line 1110 turns the NOMON controls on. Sometimes it is desirable to see some of the data passing to or from the disk. In this program, I turned everything off. In line 1120, my clock routine is loaded into memory for future use. If there is no routine there, an error will be generated and mess things up. Leave it out or substitute something else here. Lines 1130 to 1160 print a heading and ask for the name of a file. Enter the name of your first file — something like Inventory or Apple II Articles — and press RETURN. The program now passes on through the System Variables listing to the Operating System.

Operating System

The Operating System is a section of the program including an option selection menu and control for directing input requests. Line 1350 CALLs a Mountain Hardware clock output routine. The date and time is available each time the options menu is selected. An error will occur if you try to use this command without a legitimate routine to CALL. In fact, a CALL to nothing in particular will blow the program. Options for the file are printed by lines 1380 to 1430. Existence of a file is checked in lines 1440 through 1480. If the file, named in line 1150, previously existed, then the number of records are posted on the screen along with the name of the file. If the file named is a new file and no records existed, then error #5 is generated.

These lines (1440 - 1480) use DOS commands to make the test for a file. Line 1440 is used to OPEN the file F$ with a length of 40 characters in each record. The contents of record 0 are READ in line 1450 to INPUT the value C, the record count. It is at this point that the OUT OF DATA error, #5, occurs and Build New Records option is selected for a new file. If the MON I,O,C commands were left on at this point, you would see the error displayed on the screen. If there is an existing file, the file is CLOSED in line 1460. The number of records and the name of the file are displayed in line 1470. Input for the option selection is accepted in line 1480 and tested for range in lines 1490 and 1500. Numbers greater than 5 return the program back to the options list again. A zero POKEs the DOS error register back to zero, CLOSEs the file, sets SPEED back to the fastest value, and ENDs the program. Line 1510 sends the program to the program line number corresponding to the file option selected. Branches occur according to the value of S, like this:

S=1, GOTO 1520 - Build the File
S=2, GOTO 1620 - Add Records
S=3, GOTO 1900 - List Records
S=4, GOTO 2110 - Edit a Record
S=5, GOTO 2350 -
Keyword Search

Because numbers greater than 5 are trapped and zero stops the program, branching to the requested option is quite reliable.

New and Bigger

Building a new file and adding records options do essentially the same thing. The new file has to start at one and new record adds start at the

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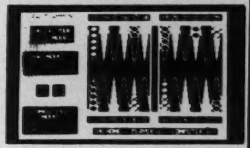

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Apple Cart, cont'd...

last record plus one. Otherwise, the file must first be OPENed and prepared for accepting records. Let's start with BUILD FILE and detail the steps used for this segment of the program.

To start the file building process, a short reminder of the option and file name are printed by line 1560. The named file is OPENed in line 1570 for a length of 40 characters. This length was chosen because the output is listed only on the screen. Next, line 1580 uses a control D to halt DOS action. Doing this prevents further program activity from creating garbage in the file. Line 1770 prints the current record number and waits for INPUT. A test for file END is included in line 1780. If the input is END, the program branches to line 1840 and record processing is concluded. Line 1790 makes DOS active again for a WRITE and line 1800 PRINTs (or WRITEs) the record to the DOS buffer. The buffer accepts up to 256 characters and then transfers them automatically to the disk. The buffer contents get transferred to the disk when the file is CLOSEd, too. DOS action is stopped again in line 1810, the record counter is incremented in line 1820 and the program returns for another record at line 1830. This loop continues until the input equals END in line 1780 and the branch to line 1840 is taken.

No new record was added when END was typed. So the counter (C) is decremented and the result printed in line 1840. DOS is again activated and the current record count is written into record zero. Lines 1850 and 1860 do the record count work, and line 1870 CLOSEs the file. In line 1880, a GET command in combination with CHR$(13) is used to exclude all key input except RETURN. When RETURN is pressed, the program returns to the option menu.

Adding records uses two more steps than starting a new file. First, the previous record count is READ in from record zero. Then, the last record entered is READ. This is accomplished in lines 1700 and 1720. The record number and the record are printed in line 1740. Having this information on the screen provides a model for subsequent entries. The record count is incremented in line 1760 and the rest is the same as new record processing.

Listing Records

Up to line 2000, the List program functions are much the same as processing new and added records. Line 2010 starts a loop that lists the contents of the file. A file suspension routine using the WAIT command in combination with a PEEK at the keyboard and a POKE at the keyboard reset is included in line 2020. Each record is INPUT (READ) to the DOS buffer and printed on the screen. When all records are listed, the file is CLOSEd and control is returned to the options menu.

Use of the list option allows scanning the file for one or more records. Speed control is another feature that could be added for listing records. The suspension routine stops and starts the list routine. But, the records still go by quite fast on the screen. Include a line to set the Speed to 125 at the beginning of the listing loop. A header to describe the contents of the file is another possible option. Add a line to put titles on the fields and keep it on the screen with a POKE 34,N.

```
1950 PRINT"DESCRIPTION....COST
      ...DATE PUR"
1955 POKE 34,4
.
.
.
2006 SPEED=125
.
.
.
2096 POKE 34,0 : SPEED=255
```

New line 1955 holds the top of the screen at 4 lines until the listing is completed. Be sure to disable or reset any special controls you use. You'll get some funny results otherwise.

Now, suppose you would also like to add the cost figures in the cost column. The records have been used as one continuous string, so something besides adding simple variables together is needed. In this example program, the cost figures start in column 22 and are 7 characters wide. Add lines to add the figures in these columns like this:

```
2004 LET T=0
.
.
.
2065 LET ST=VAL(MID$(R$,22,7)):
      T=T+ST
.
.
.
2074 PRINT:PRINT TAB (24)"$";
      INT(T*100+.5)/100
```

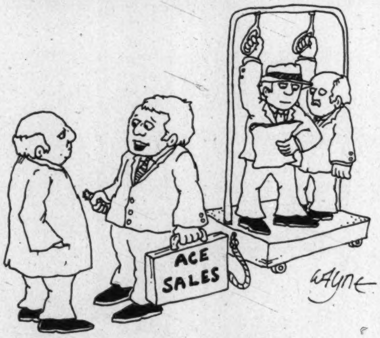
Each time a record is READ, line 2055 extracts the VAL of the cost column as a subtotal (ST) and starts summing the total (T). When the list is complete, the final total is printed with a $ under the cost column. If you change the position of the cost field, be sure to adjust MID$ and Total TAB too.

Edit a Record

To edit a record with this very simple editor, you must know the number of the record(s) to be edited. The technique used is quite simple, but effective for short and simple records. After requesting the record number, the file is opened and prepared for reading records. The requested record will be displayed on the screen with the record number. After it's displayed, you get a chance to change it or leave it alone. If the record was the wrong one, just press N and the record is stored back on the disk unchanged. A Y to change the record displays the INPUT prompt (?) on the screen. You can then type in a new line, being careful to follow the exact format. Or, you can use escape D to move the cursor up to the displayed record. Then use the right arrow key to move to the part of the record to be changed. Retype the changes as needed and move the cursor to the end of the line. Press RETURN. The new record will be put on the disk in place of the old one. A bit more sophisticated approach would use VTAB and HTAB to position the INPUT prompt at the beginning of the line to be changed. The step to use escape D to move the cursor is not needed if this is done. After all changes are made, the program returns to the option menu. (Remember, I said it was a simple editor.)

Keyword Search

This routine is useful for finding all the items with the same name or things in the same year or month and so on. For most of the files I am using, I prefer to use a search rather than a sort. For nice ordered lists of things though, a sort is the only way. But, that's a story for another time. Keyword search was described in detail in the January '80 Apple Cart. Most of the detail included opening, reading and closing Apple II DOS files. These details have been covered here too, so on to the meat of the program.



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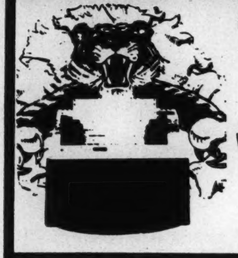

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Apple Cart, cont'd...

After requesting the keyword to be located, the file is OPENed and prepared for READing records. A loop for calling-up each record starts at line 2510. Each record is then scanned, 1 character at a time, for the keyword. If a keyword is found, the record is displayed and a flag is set. The program returns for the next record and continues the search. If no keywords were found, a prompt to look for another keyword is displayed. If records were found containing the keyword, you are also given the option to make changes. The option to search for more keywords is also displayed. Answering No to both of the prompts returns the program to the option menu.

More Zing

Several times during this discussion the simplicity of the program has been emphasized. There are a number of features that would make using file more productive. Each improvement would make the program more confusing and difficult to explain. A program for cataloging magazine articles from Southeastern Software uses a number of clever features. The human factors of using the program were greatly improved by the techniques used. Inclusion of sort routines and more ideas for building records and formatting will be included in future columns.

Basic on Videotape

Videocassettes teaching computer applications and programming fundamentals are now available to businesses and schools. The concept, called Evolution 1 (TM), was created by Dr. Portia Isaacson of Electronic Data Systems (EDS) in Dallas.

Currently available are 4 tapes of interest to potential Apple owners (and other beginning Basic programmers). The videotape presentation, using familiar analogies, makes no assumptions about prior knowledge of computers or programming. Lesson 1 starts with instructions on getting the computer operating. The viewer is then taught to use several Basic programming commands in a refreshing, unhurried manner. By the end of the fourth tape, the viewer has acquired sufficient skill to proceed with confidence, to more advanced challenges. Each tape is accompanied by a study booklet. The booklets are easy to use and effectively reinforce learning through color highlighted text and representations of a video screen. The booklets could be used separately but all the supporting information from the tape presentation would be lost. Additional tapes, teaching more advanced Basic, are planned.

Other videotapes in the Evolution 1 (TM) series include 2 Point Of Sale (POS) tapes and 2 Business application tapes. The POS tapes are designed to support retail sales people with technical information. Business applications illustrate techniques for using a small computer in a small business. Three new lessons are planned for the business series too. The newest entries include an 8 tape series titled 'Little Computers . . . See How They Run.' These tapes describe various microcomputer features and accessories including detail of the microprocessor chip itself.

Tapes are available to computer retailers, distributors, educational people and corporations on a lease basis. The lease rate is $35.00 per month per tape with a 6 tape minimum. Tapes can be mixed in combinations. These tapes can be exchanged during the year for a $40.00 fee. One set of study booklets comes with each tape series. Additional sets cost $10.00 to $20.00 per set.

For more information, call Evolution 1 at 800-527-0278 (in Texas, 214-661-4070), or write them at 14580 Midway Road, Dallas, TX 75234. Also, look for these videocassettes at your local computer store.

Super Invader: A Review

This recreational diversion (sometimes called a game) is addictive. The constant challenge for higher and higher scores closely parallels gambling. Except you have nothing to loose but your sanity.

Super Invaders, by M. Hata, is a real time, interactive high-res graphics program. Graphics implementation is excellent. Animation is included as the invaders flap their way towards destruction of your cannons and your blockade. An invader cheering section adds insult to injury each time one of your laser cannons is destroyed. However, there is some retribution as the cheering section shows remorse when the last invader in each wave is destroyed. A high-flying 'saucer' provides additional scoring as it flies at random across the top of the screen. Space sounds are used to emphasize the affect of laser fire, invader demise and to announce the flight of the saucer. The randomness of various scoring features adds to the challenge of going-for-more.

As of the date this is being written (mid Jan '80), my son has achieved a score of over 5800. My score is somewhat less. Super Invaders has been described as the game that drove Japan crazy. I'm sure you will agree once you've tried it (and tried it and tried it . . .). The game is available from such diverse sources as Creative Computing Software (see add on page 23) and from your local computer store. The cost is $19.95 on tape or diskette.

Data Base Management System

If you're looking for a technically well designed Data Base Management System, try the one from High Technology. The system has many features allowing flexible data base operations. There are also some not-so-good features. This is how I would summarize my evaluation:

- Software Engineering .... Excellent
- Human Factors .... Poor
- Documentation .... Marginal

Once set-up, the features and flexibility of the system make it excellent for use with structured data base requirements. For instance, mailing lists, customer records, inventory management and perhaps some types of personal record management. For our application, a structured diskography using 9 files with 4 sorts including 2 secondary and 1 tertiary sort, the system is an excellent choice. A listing of our master file set-up is shown in Figure 1. Let's look at the not-so-good things first and get them out of the way.

Human Factors

The complexity of the set-up requirements precludes use of this system by many people not familiar with programming. Even though the program software is well engineered, the lack of helpful prompts and examples geared to a non-technical target population minimize its usefulness. Correction of errors is clumsy: A RESET and rebooting is the only way you can recover from a processing error (one that sets off an obnoxious siren sound). For an input entry error, you must complete all input for the record, then call the MODIFY option. Once in operation, use is simpler, but there are still a large number of entries required to access the data. Also, there are no easily understood error messages.

Documentation

There are only 23 partially filled pages of documentation in a 3 ring binder. The documentation consists of brief descriptions of each menu option. The descriptions do not include meaningful examples, and little consideration is given to interactions between options. For instance, it is necessary to use option 13 before you

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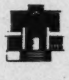

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The ANA1 two letter user commands are: CA = Calculate, no graph. CG = Clear Graphs, leave Grids. CK = Checking out program, known data. CO = Color of next graph (red, green, violet, white, blue). CS = Clear Screen. DL = Draw Line between points. FI = Filter data for time, magnitude, or percent change. FU = Data, transform, or constant Function with +,-,x,/ operator. GD = Graphic mode, display all Graph Data on screen. GR = Graph data to screen. GS = Set Grid Scale. HE = Help, summary of any commands usage. LD = Load Data from disk file from inputted date to memory. LG = Leave Graphs, automatic Grid rescaling. LO = Look, select a range of the LD data and GR; All commands can now be used on this range. LS = Least squares linear fit of the data. MA = Moving Average of the data. NS = No Scale, next graph on screen does not use Grid Scale. NT = No Trace. PR = User implimented Printer routine. TD = Text mode, display Text Data on screen. TI = Time number to date or vice versa. TR = Trace. TS = Text Stop for number of lines outputted to screen when in TD. U1/U2 = User 1/2 implimented routines. VD = Values of Data outputted in text. VG = Values of Grid; low/high/delta. VT = Values of Transform outputted in text.

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* Software Review in Call-A.P.P.L.E. (2/80): "An example of an excellent piece of software exploiting most of Apple II's major features." Overall Rating = 92.1

* Software Review in Apple Orchard (3/80): "A remarkably flexible approach to the analysis and plotting of any time series data." Overall Rating = 85.7

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Apple Cart, cont'd...

can use option 2. Another shortcoming was the description of 'Literals' in the menu option 7. These turned out to be optional field headings for use with the output formatting set-up. The literals would replace the names of fields used for the print out. In all menu options, it is not apparent what the input limitations are. You are left to your own devices to find out. Some walk-through examples are needed.

One other item. There is no way to know how much space is used or is left on the text file disk. By another method, I found there are about 100K bytes of space on a formatted disk. Our records are 224 bytes long and 250 of them used about 75K. Allow about 10% for the sorting keys, formatting files and other overhead and there was something over 20K left for additions and changes.

The Good Stuff

Part of the confusion when first using this system comes from its complexity. You can do a great many things with this data base. A certain learning experience is needed before you can become comfortable with the system. Here's a list of some of the features included in the 14 menu options:

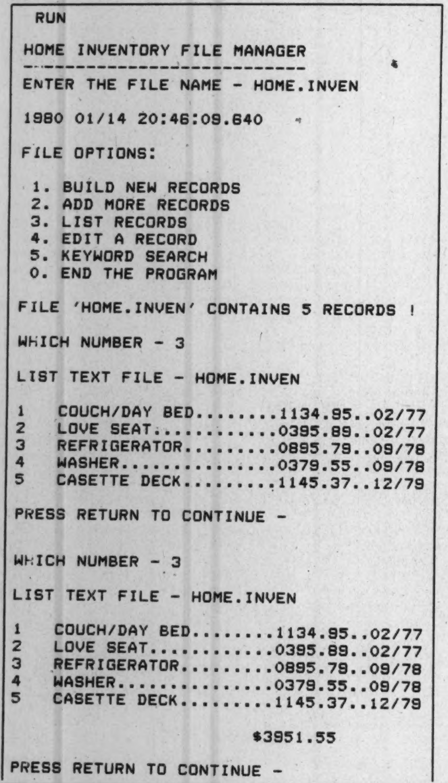
- Develop a named data base with up to 20 fields, set the size of each field in the record (255 characters per record), and designate whether each field is alpha or numeric. Up to 10 additional field names — called literals — are also allowed.
- Sort on any field number, and any combination of up to 10 sub and sub-sub fields.
- Set-up and change master program parameters to allow for format and data base variations. Options include printer slot, printer type, lines per page, number of printed columns — up to 250, name of file in use and the slot the text file disk is in.
- A variety of options to create and change the data base, enter the data, search for records and other useful housekeeping operations.
- Develop your own format for printing the data. You can include several formats on the text file disk. Another option prints the data base in a mailing list format. Input has to be developed a specific way to use this option. The option to total numbers in any column is also included.
- Initialize a diskette and exit from the system are two more options included in the menu.

When using any DBM system, keep in mind the speed of sorting operations. Even though it is realistic to manage a large amount of data with your Apple II, don't expect to do it very fast. There is not enough RAM memory left to hold more than a few Kbytes of records at a time. Consequently, a lot of swapping takes place between the disk and memory when large files are sorted. In Figure 1, the number of sorts and sub sorts used is 7. We found that sorting 250 records required one-half hour. Once sorted into keyed files however, the data was quickly retrieved. Printing a copy of the file was as fast as the printer could go.

Not Too Bad Really

High Technologies DBM system is a powerful tool and will do a lot of work for you. I discussed many of the items here with Nancy Galloway, Software Manager, at High Technology. She was quite helpful and suggested several things to simplify use of the system. Among them was the idea to set-up your master file on the text diskette and then use it for a master. Make copies and use the copies for saving your various data files. Nancy also mentioned that many improvements are being made in the system.

Even though I found the system awkward to use at first, I have not found any other that will do the job better. The system is available at computer stores. The cost is $99.50.□



```
 RUN

HOME INVENTORY FILE MANAGER
---------------------------
ENTER THE FILE NAME - HOME.INVEN

1980 01/14 20:46:09.640

FILE OPTIONS:

 1. BUILD NEW RECORDS
 2. ADD MORE RECORDS
 3. LIST RECORDS
 4. EDIT A RECORD
 5. KEYWORD SEARCH
 0. END THE PROGRAM

FILE 'HOME.INVEN' CONTAINS 5 RECORDS !

WHICH NUMBER - 3

LIST TEXT FILE - HOME.INVEN

1   COUCH/DAY BED........1134.95..02/77
2   LOVE SEAT............0395.89..02/77
3   REFRIGERATOR.........0895.79..09/78
4   WASHER...............0379.55..09/78
5   CASETTE DECK.........1145.37..12/79

PRESS RETURN TO CONTINUE -

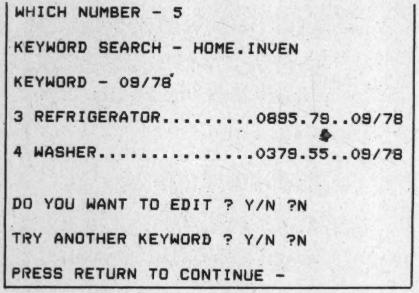
WHICH NUMBER - 3

LIST TEXT FILE - HOME.INVEN

1   COUCH/DAY BED........1134.95..02/77
2   LOVE SEAT............0395.89..02/77
3   REFRIGERATOR.........0895.79..09/78
4   WASHER...............0379.55..09/78
5   CASETTE DECK.........1145.37..12/79

                      $3951.55

PRESS RETURN TO CONTINUE -
```



```
WHICH NUMBER - 5

KEYWORD SEARCH - HOME.INVEN

KEYWORD - 09/78

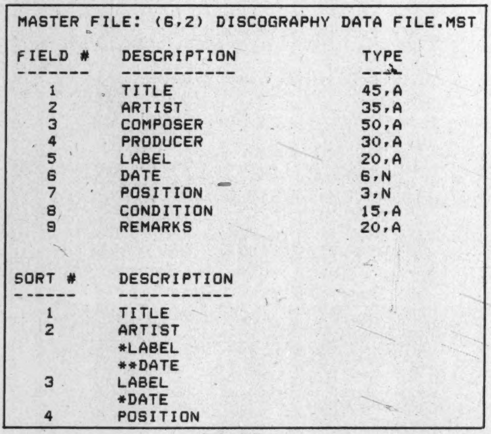
3 REFRIGERATOR.........0895.79..09/78

4 WASHER...............0379.55..09/78


DO YOU WANT TO EDIT ? Y/N ?N

TRY ANOTHER KEYWORD ? Y/N ?N

PRESS RETURN TO CONTINUE -
```



```
MASTER FILE: (6,2) DISCOGRAPHY DATA FILE.MST

FIELD #    DESCRIPTION             TYPE
-------    -----------             ----
   1       TITLE                   45,A
   2       ARTIST                  35,A
   3       COMPOSER                50,A
   4       PRODUCER                30,A
   5       LABEL                   20,A
   6       DATE                    6,N
   7       POSITION                3,N
   8       CONDITION               15,A
   9       REMARKS                 20,A


SORT #     DESCRIPTION
------     -----------
   1       TITLE
   2       ARTIST
           *LABEL
           **DATE
   3       LABEL
           *DATE
   4       POSITION
```

FIGURE 1

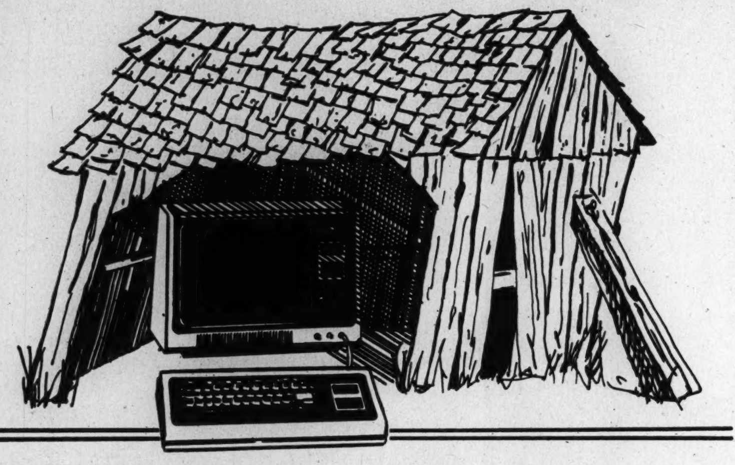
```
1000  REM ************************
1010  REM * SIMPLE FILE BUILDER *
1020  REM * BY: CHUCK CARPENTER *
1030  REM ************************
1040 :
1050  REM  ** INITIALIZE **
1060  REM  ****************
1070 :
1080  HOME
1090  ONERR  GOTO 2720
1100  LET D$ =  CHR$ (4): DIM R$(200):C = 1
1110  PRINT D$;"NOMON I,O,C"
1120  PRINT D$;"BLOAD B.TIME": REM  DATE & TIME
1130  HOME : VTAB (2): PRINT "HOME INVENTORY FILE MANAG
     ER"
1140  FOR I = 1 TO 27: PRINT "-";: NEXT I: PRINT
1150  INPUT "ENTER THE FILE NAME - ";F$
1160 :
1170  REM  ** SYSTEM VARIABLES **
1180  REM  **********************
1190 :
1200  REM  F$= FILE NAME
1210  REM  D$= CONTROL D
1220  REM  R$= FILE RECORD
1230  REM  A$= RETURN (CHR$(13))
1240  REM  Q$= LOCAL RESPONSE
1250  REM  I&J LOCAL VARIABLES
1260  REM  C = RECORD COUNT
1270  REM  S = OPTION SELECTION
1280  REM  R = RECORD # TO EDIT
1290  REM  K$= KEYWORD TO SEARCH
1300  REM  K = SEARCH FLAG
1310 :
1320  REM   ** OPERATING SYSTEM **
1330  REM   **********************
1340 :
1350  CALL 900: REM   DATE & TIME
1360  PRINT : PRINT "FILE OPTIONS:
1370  PRINT
1380  PRINT " 1. BUILD NEW RECORDS"
1390  PRINT " 2. ADD MORE RECORDS"
1400  PRINT " 3. LIST RECORDS"
1410  PRINT " 4. EDIT A RECORD"
1420  PRINT " 5. KEYWORD SEARCH"
1430  PRINT " 0. END THE PROGRAM"
1440  PRINT : PRINT D$"OPEN";F$;",L40"
1450  PRINT D$"READ";F$;",R";0: INPUT C
1460  PRINT D$"CLOSE";F$;""
1470  PRINT "FILE '";F$;"' CONTAINS ";C;" RECORDS !"
1480  PRINT : INPUT "WHICH NUMBER - ";S
1490  IF S > 5 GOTO 1350
1500  IF S = 0 THEN  PRINT : PRINT : PRINT "DONE": POKE
    216,0: PRINT D$"CLOSE";F$;"": SPEED= 255: END
1510  ON S GOTO 1520,1620,1900,2110,2350
1520 :
1530  REM  ** BUILD THE FILE **
1540  REM  ********************
1550 :
1560  HOME : VTAB (2): PRINT "BUILD FILE - ";F$;" "
1570  PRINT D$"OPEN";F$;",L40"
1580  PRINT D$
1590  GOTO 1770
1600 :
1610  REM  ** ADD RECORDS **
1620  REM  *****************
1630 :
1640  HOME
1650  PRINT : VTAB (2): PRINT "ADD FILE RECORDS - ";F
    $;"": PRINT
1660  PRINT D$"OPEN";F$;",L40"
1670  PRINT D$"READ";F$;",R";0
1680  INPUT C
1690  PRINT D$"READ";F$;",R";C
1700  INPUT R$(C)
1710  PRINT D$: PRINT
1720  PRINT "R";C;"";: PRINT  TAB( 6)R$(C)
1730  PRINT
1740  LET C = C + 1
1750 :
1760 :
1770  PRINT "R";C;" ";: INPUT R$(C)
1780  IF R$(C) = "END" GOTO 1840
1790  PRINT D$"WRITE";F$;",R";C
1800  PRINT R$(C)
1810  PRINT D$
1820  LET C = C + 1
1830  GOTO 1770
1840  LET C = C - 1: PRINT : PRINT C: PRINT
1850  PRINT D$"WRITE";F$;",R";0
1860  PRINT C
1870  PRINT D$"CLOSE";F$;""
1880  PRINT : PRINT "PRESS RETURN TO CONTINUE - ";: GET
    A$: IF A$ =  CHR$ (13) THEN  HOME : VTAB (5): GOTO
    1350
1890  HOME : GOTO 1880
1900 :
1910  REM  ** LIST RECORDS **
1920  REM  ******************
1930 :
1940  HOME
1950  PRINT : PRINT "LIST TEXT FILE - ";F$;""
1960  PRINT
1970  PRINT D$"OPEN";F$;",L40"
1980  PRINT D$"READ";F$;",R";0
1990  INPUT C
2000  PRINT D$
2010  FOR I = 1 TO C
2020  IF  PEEK ( - 16384) > 127 THEN  POKE  - 16368,0:
    WAIT - 16384,128,0: POKE  - 16368,0
2030  PRINT D$"READ";F$;",R";I
2040  INPUT R$(I)
2050  PRINT D$
2060  PRINT I; TAB( 4);R$(I)
2070  NEXT I
2080  PRINT D$"CLOSE";F$;""
2090  PRINT : PRINT "PRESS RETURN TO CONTINUE - ";: GET
    A$: IF A$ =  CHR$ (13) THEN  HOME : VTAB (5): GOTO
    1350
2100  HOME : GOTO 2090
2110 :
2120  REM  ** EDIT A RECORD **
2130  REM  ******************
2140 :
2150  HOME
2160  PRINT : PRINT "EDIT FILE RECORD - ";F$;"": PRINT

2170  PRINT "ENTER RECORD NUMBER - ";: INPUT R: PRINT
2180  PRINT D$"OPEN";F$;",L40"
2190  PRINT D$"READ";F$;",R";R
2200  INPUT R$(R)
2210  PRINT D$
2220  PRINT "RECORD ";R;" CHANGES - 35 CHARACTERS MAX."

2230  PRINT : PRINT "RECORD ";R;" ="
2240  PRINT " ";: PRINT R$(R)
2250  PRINT : INPUT "DO YOU WANT TO CHANGE IT - Y/N ";Q
    $: PRINT : IF Q$ = "N" GOTO 2320
2260  INPUT R$(R)
2270 :
2280  PRINT D$"WRITE";F$;",R";R
2290  PRINT R$(R)
2300  PRINT D$"CLOSE";F$;""
2310  VTAB 17
2320  PRINT "ANY MORE RECORDS Y/N ";: INPUT Q$: IF Q$ =
    "Y" GOTO 2110
2330  PRINT : PRINT "PRESS RETURN TO CONTINUE - ";: GET
    A$: IF A$ =  CHR$ (13) THEN  HOME : VTAB (5): GOTO
    1350
2340  HOME : GOTO 2330
2350 :
2360  REM  ** KEYWORD SEARCH **
2370  REM  ********************
2380 :
2390  HOME
2400  PRINT : PRINT "KEYWORD SEARCH - ";F$;""
2410  PRINT : INPUT "KEYWORD - ";K$
2420  LET K = 0
2430  PRINT D$"OPEN";F$;",L40"
2440  PRINT D$"READ";F$;",R";0
2450  INPUT C
2460  PRINT D$
2470  FOR J = 1 TO C
2480  PRINT D$"READ";F$;",R";J
2490  INPUT R$(J)
2500  PRINT D$
2510  FOR I = 1 TO 40 -  LEN (K$)
2520  IF  MID$ (R$(J),I, LEN (K$)) <  > K$ GOTO 2550
2530  PRINT : PRINT J;: PRINT " ";: PRINT R$(J)
2540  LET K = K + 1
2550  NEXT I
2560  NEXT J: PRINT
2570  IF K > 0 GOTO 2610
2580  PRINT : PRINT "NOTHING FOUND - ": PRINT "TRY ANOT
    HER KEY WORD ? Y/N ";
2590  INPUT Q$: IF Q$ = "Y" GOTO 2350
2600  IF Q$ = "N" GOTO 2660
2610  PRINT D$"CLOSE";F$;""
2620  PRINT : PRINT "DO YOU WANT TO EDIT ? Y/N ";
2630  INPUT Q$: IF Q$ = "Y" GOTO 2110
2640  PRINT : PRINT "TRY ANOTHER KEYWORD ? Y/N ";
2650  INPUT Q$: IF Q$ = "Y" GOTO 2350
2660  PRINT : PRINT "PRESS RETURN TO CONTINUE - ";: GET
    A$: IF A$ =  CHR$ (13) THEN  HOME : VTAB (5): GOTO
    1350
2670  HOME : GOTO 2660
2680 :
2690  REM  ** ERROR ROUTINE **
2700  REM  ******************
2710 :
2720  IF  PEEK (222) <  > 5 THEN  PRINT "PROCESSING ERR
    OR": SPEED= 255: GOTO 1350
2730  IF  PEEK (222) = 5 THEN  PRINT : PRINT "THIS IS A
    NEW FILE": FOR I = 1 TO 5000: NEXT : GOTO 1520
2740 :
2750  REM  CRC - 5 JAN 1979
2760 :
```

LISTING 1

TRS-80 Strings



Stephen B. Gray

In column 17, we look at kaleidoscope graphics with variations on RND(RND(X)), Radio Shack's mailing-list program, the disappearance of G/2, Hayden's Microtyping program, the fate of four TRS-80 cassette-tape magazines, and a directory that lists hundreds of TRS-80 tapes.

Variations On RND(RND(X))

In the Kaleidoscope Graphics section of the TRS-80 Strings column for Sep 1979 (p 186), it was shown how to skew the pattern blocks toward the four corners of the four-way-symmetrical design by using RND(RND(X)), and even more by using RND(RND (RND(X))).

The pattern, created by using the same number of RNDs for both the X and Y coordinates, is still four-way symmetrical. A whole new set of patterns, with their own particular attractiveness, can be created by using different numbers of RNDs for X and Y in the general program in the center of page 188, such as with:

```
110 X=RND(RND(A))
120 Y=RND(RND(RND(B)))
```

or the other way around by using

```
110 X=RND(RND(RND(RND(A))))
120 Y=RND(B)
```

Although the patterns are still four-way symmetrical, the more RNDs you use, the more two-way they seem. The first X-Y pair given above will provide a top-and-bottom pattern with a short gap across the middle; the second pair, a left-right pattern with a wider gap across the middle.

Just in case you don't have the September 1979 issue handy, here's the general kaleidoscope pattern, written more compactly:

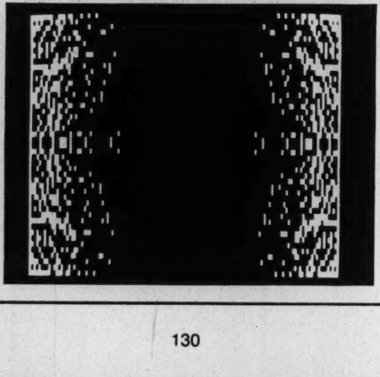
```
100 CLS:INPUT A,B:CLS
110 X=RND(A)
120 Y=RND(B)
130 C=2*A-X:D=2*B-Y
140 SET(X,Y):RESET(X+1,Y+1)
150 SET(X,D+1):RESET(X+1,D)
160 SET(C+1,Y):RESET(C,Y+1)
170 SET(C+1,D+1):RESET(C,D)
180 GOTO 110
```

Try from one to five RNDs for both X and Y. If the graphics blocks were square, you'd have the same type of pattern, turned 90 degrees, if you wrote, for example, one program with three RNDs in X and four in Y, and a second with four RNDs in X and three in Y. But because the graphics block is rectangular, each one of the 25 programs possible with one to five RNDs in both X and Y will produce basically different patterns.

Because these multi-RND patterns are sparser than single-RND ones, they lend themselves more to full-screen kaleidoscope patterns, which are too big and confusing when only one RND is used in both X and Y. Try, for instance,

```
110 X=RND(RND(RND(RND(A))))
120 Y=RND(B)
```

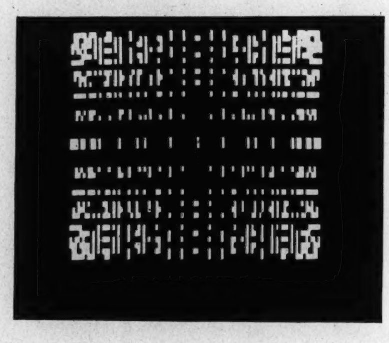
and A,B values of 63,23. You might call the resulting pattern something like "Twin Aliens Meet In Space," or "Space Garbage Meets Radar Reflector."



For something quite different, substitute these lines for 100-130 in the general program:

```
100 CLS:INPUT A,B,E,F:CLS
110 X=RND(A)*RND(B)
120 Y=RND(E)*RND(F)
130 C=2*A*B-X:D=2*E*F-Y
```

and use values for A,B,E,F such as 10,5,5,4. This looks best during the first few minutes, although at the end it has a certain charm, looking like a moth-eaten Mondrian.



Cassette Mailing List

This $19.95 Radio Shack program for a Level-II TRS-80 with at least 16K of ROM is also available at $39.95 on diskette for 32K two-disk business systems.

According to the manual, typical uses of the Mailing List System are club membership lists, customer lists for advertisement mailings, Christmas card lists, personal telephone directory, and client lists.

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*Sort timings shown below are nominal times. Times will vary based on sort and system configurations. Nominal times based on Mod I 48K 4-drive configuration, 64 byte records, and 5 sort keys.

TYPE	FILE SIZE (Bytes)	SORT TIME (Sec)	TYPE	FILE SIZE (Bytes)	SORT TIME (Sec)
SORT	16K	33	SORT	340K	1081
SORT	32K	49	SORT	680K	2569
SORT	85K	173	SORT and MERGE	85K SORT + 1275K Merge	1757
SORT	170K	445			

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Strings, cont'd . . .

For most of these uses, you'll want labels, which means you'll also need a tractor-feed line printer, expansion interface and labels, all of which Radio Shack can supply; the $3\frac{1}{2}$-by-$\frac{15}{16}$-inch labels are Cat. No. 26-1404.

After you load in the tape, you get a menu:

```
(A)DD NAMES TO THE MAILING LIST
(R)EAD MAILING LIST FROM TAPE
(S)EARCH/CHANGE THE MAILING
    LIST
(L)IST NAMES ON THE SCREEN
(P)RINT MAILING LIST
(W)RITE MAILING LIST ON TAPE
```

You select one of the six options by typing the first letter of the command. If you select the first, you have the choice of including a telephone number or company name in the address, but not both. You enter name, company or telephone number, address, city, state, zip and, if you've opted to include it, a select code.

You may wish, as the manual says, to use the select code to indicate whether a person in your club-membership list has paid his dues. Using this code, "the club could then print labels for paid-up members to send them activities notices, and later print another set of labels for members-in-bad-standing to send them payment reminders."

Or you could print labels only for people who live in a certain state or city, or who have a zip code beginning with certain digits.

You can type the name with the family name first or last, but the program sorts according to the first name on the first line. So if you want the names to be sorted according to family name, you enter them in directory style,separating the last name from the first with a comma. When the labels are printed, the program will rearrange the name to print the first name first and the last name last.

Pressing L causes the names in memory to be listed on the screen, just the names only, in alphabetical order. Pressing S lets you locate a particular name for reference or alteration. You enter enough letters of the name to identify it, and you get a new menu, with six choices, along with the name and accompanying information. You can then display the name before or after the one on view, delete the name displayed, change part of the information, cancel the changes made, or search for a new name.

To print mailing labels, press P. The program asks if you want to print labels for the whole list, and if not, which field you would like to use for a select code, and then requests that you "type in a value for the select code." If you want to print labels only for members in Oshkosh, you type in OSHKOSH as the select code. Or, as the manual states, "This feature is especially useful when applied to the zip code field. By specifying the first 3 digits of the zip code, you can print labels for 'sorted bundles' and take advantage of reduced postal rates."

The program asks if you want a trial printing run, so you can align the labels and adjust the character size (if you're using a printer with that feature). If you reply Y instead of N, the first label will be printed three times. Once the labels are aligned, reply N for "no more trial runs" and press ENTER to start printing.

When printing is completed, the program asks if you want to read in any more tapes, which allows you to load additional names into memory and continue printing with the same selection criterion.

Cassette tapes are used to save names and addresses, so there is no limit to the number of cassette tapes you can create with the system. There is, however, a limit to the number of names on each tape, and it's a function of your TRS-80's memory size. If the average list entry is 50 characters long, you can put up to 150 names into 16K of RAM memory, up to 450 with 32K, and up to 750 with 48K.

The cassette program is packaged in a ring binder with one program cassette, one C-20 blank data cassette, and a 12-page manual. The last five pages contain a full listing of the program in Basic. The binder has space for six more cassettes, handy storage if you have a long mailing list.

The disk version seems to be exactly the same. It comes with one program diskette and one blank diskette in a bound manual. Each blank diskette will hold about 600 names, with the exact number depending on the length of the listings.

According to the software info sheet on the Disk Mailing List System, "If you don't need a mailing list, you could use it [the program] to catalog items of various types and print selected lists for you . . . with or without program modification."

This is just the program for your club or business if you have more than a small number of labels to print regularly.

G/2 Is GWTW

If you've been wondering what happened to those fancy four-color ads for the G/2 Program Library that GRT Corp. was running in **Creative** and elsewhere in 1978, it's because G/2, GRT's Consumer Computer Group, no longer exists. GRT, of Sunnyvale, CA, filed Chapter XI of the federal bankruptcy laws, after losing over two million dollars up to the fall of 1978.

G/2 had several dozen cassette tapes for the Apple, Southwest, Sol, PET, Sorcerer and Level-II TRS-80. The half-dozen for the TRS-80 included Beat The House (blackjack, craps, roulette, slot machine), Clinic (biorhythms, dieting, longevity), Personal Finance (Checkbook, Best Choice). That last program was for decision-making.

All the principles of the G/2 division left GRT in late 1978, and the software companies that had licensed GRT to manufacture and market their products, have taken back the programs. These programs will now, in some cases, be marketed by the companies that wrote them, such as Level III by Microsoft.

GRT continues with their main business, which is producing and marketing pre-recorded music tapes. Music tapes can stand a lot of dropouts and other problems before they really get bad. But I couldn't even load the copy of Clinic that G/2 sent.

Incidentally, I heard that to make writing the G/2 tapes as easy as possible, no graphics were used at all.

So G/2 is gone with the wind, cancelling an ambitious assortment of tapes that also included Oil Tycoon, Adventure, The Market and a couple of Extended Basics.

Microtyping

Microtyping is the first of the "Hayden Computer Program Tapes" I've checked out, and it is one of the most ingenious and useful programs I've even come across, well worth the $10.95 price.

Written for Level-II 16K machines by Dr. C. William Engel, who wrote the *Simulating Simulations* games programs (available now in book form from Hayden Book Co. for $4.95), the cassette comes in a plastic envelope (with a hole near the top, for peg-board or stand mounting) that's handy to keep the cassette in.

Also in the envelope is an attractive four-page folder. The cover shows a logo and title in black and white on green, distinctive enough to be spotted across the room in your local computer store, which is where you can buy this tape (or if not available, from the Sales Dept., Hayden Book Co., Inc., 50 Essex St., Rochelle Park, NJ 07662.)

The folder's back cover, which you can read through the plastic envelope in the computer store, tells you that *Microtyping* teaches touch typing, and gives some details.

CASSETTE DUPLICATION

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Our Mar-Apr 80 issue tells about how one person improved the resolution on the '80 by a factor of 6! The photo on the cover of that issue tells the story. There is also a complete listing in BASIC of a disk-based file system, using random files and hash codes. Also in BASIC is a program that compares dollar values between any years from 1881 to 1980, and it gives comparative cost figures for housing, transportation, food, etc. (it is in L2 16K). In the "fun and games" department, there is a complete BASIC listing of a game where you play nine games of tic-tac-toe at the same time - the computer is your opponent. In the utilities department there are two methods of creating graphs, a program to give you a HEX dump of memory, and - a program to give you number conversion from decimal/octal/hex/binary. In assembly language, there is a complete listing which allows you to selectively scroll any portion of the screen, while leaving the rest of it intact! Plus, there are the regular features: A tutorial on the Editor/Assembler for beginners; New Products; Reviews and the Business Section. It isn't called the "TRS-80 Users Journal" for nothing! It is published regularly every two months, and costs just $16.00 per year in the U.S. Get a sample current issue (first class mail) for just $3.00. Use your VISA or Mastercharge and call (206) 475-2219 today! Or, send check or Money Order to: 80-U.S. Journal 3838 South Warner Street, Tacoma, Washington 98409

Yes! We are the people who developed "Android Nim" and other fine animated graphics programs with sound!

TRS-80 is a trademark of Radio Shack, a Division of the Tandy Corporation

CIRCLE 144 ON READER SERVICE CARD

Strings, cont'd . . .

The inside two pages comprise a User's Guide, which tells how to load and use the program. The program is divided into four levels: 1-letters, 2-numbers and symbols, 3-words, 4-text and program listings. "In each level the user receives immediate feedback regarding speed and errors. In Level 1 and 2, response speed is graphically represented by the distance between the symbol presentation and the student's response. If the response is too low or in error, the word SLOW or ERROR appears on the screen. In Levels 3 and 4, the student's response is not printed unless the correct key is pressed."

The correct finger placement on the "home keys" is shown, and "it is recommended that the student begin with the first level of difficulty in Level 1 and remain at that level until 50 wpm can be typed with no errors before proceeding to the next level of difficulty."

The guide ends with instructions on How to Insert New Practice Material in The Program, a very practical idea. The program is in Basic, so you can easily change any of the DATA lines to put in new symbols, words and sentences.

In each of the four levels, the instructions and all other material shown on the screen is in double-width characters for easy reading; the menus are in standard-width characters.

In Level 1 — Letters, you select the level of difficulty, 1 to 9, and you're presented with one letter at a time, from a group of three letters if you're at level of difficulty 1, from a group of six letters at level of difficulty 2, on up to the whole alphabet at 9.

You're shown 20 individual letters in each session, at each level of difficulty in Level 1, and as you type in the letter you're shown, it's repeated on the screen, to the right of the letter displayed by the computer, at a distance proportional to the speed with which you enter the letter after seeing the original display.

If you're really slow, then SLOW is displayed on the screen instead of the letter. ERROR is displayed if you don't match the letter displayed.

At the end of the session, you find out how you've done, in words per minute and number of errors. You can then continue at the same level of difficulty, or move on to a more (or less) difficult level, or move on to Level 2 — Numbers and Symbols.

In Level 2, you also get a session in which you match 20 characters, one at a time, at one of eight levels of difficulty, starting with one character chosen from a group of four characters, and ending, at the top level of difficulty, with a character chosen from the 32 numbers and symbols on the TRS-80 keyboard. This begins to get difficult, and if you're tempted to look at the keys, remember: you'll never learn touch-typing if you look.

Level 3 — Words presents 20 three-letter words per session, at nine levels of difficulty, from 45 words stored in the program. You can easily change any of these 45 to words of the same length, or longer.

In Level 4 — Text and Program Listings, the menu has nine selections. You can practice six selected groups of letters, or all letters, or numbers and letters, or program listings. If you select "numbers and letters," you type a sentence or two that combines words and numbers; the program selects from a group of seven in DATA lines. There's only one "program listing" stored in a DATA line, and although it's fairly complex, you can easily change it, or any of the seven groups of sentences, if you want more variety or harder material.

At all four levels, you get your words-per-minute and number-of-errors ratings.

Microtyping is a real winner in the category of useful programs. The touch-typing skill learned with this program is transferrable to a typewriter, although the symbols will, of course, be a little different.

Cassette-Tape "Magazines"

By the time you read this, Radio Shack may well have sold 300,000 TRS-80 Model I computers. Looking at that number, you might think there's plenty of room in the marketplace for more than just one of any type of TRS-80 product.

But just because there are many thousands of TRS-80 owners, doesn't always mean, as several entrepreneurs have found out, that money can be made by generating a product similar to something already on the market.

Take tape "magazines," for instance. CLOAD was there first, with a monthly tape that steadily improved, and which, even with a $36 yearly subscription price, is doing quite well. They've issued a "Best of CLOAD," at $10 (Box 1267, Goleta, CA 93017).

Several other TRS-80 tape magazines have been advertised. Two died before publishing their first monthly tape: LEVEL I (monthly, $40 a year, Anaheim, CA); and Tape Talk (bi-monthly, $?, San Jose, CA).

A fourth, Gaudeus (monthly, $30, Ozone Park, NY), was to have been a cassette magazine in several editions, for PET, TRS-80, Apple II and Sorcerer, but nothing has been heard from them for awhile.

TRS-80 Software Source

The Summer 1979 edition of "TRS-80 Software Source," which is an 8½-by-11-inch paperback, has over 4,000 listings from 250 vendors. The six main class divisions are business, education, games, home, math and utility.

The listings are given in 16 different ways. Games are on only one list, alphabetically by title. The other five classes are each listed three ways: alphabetically by title and by vendor, and by Basic (Level-I or Level-II, 4K or 16K). The 17th list is of vendor names, addresses and phone numbers.

For each listing, you get a title, description (up to 27 characters), level, price, media, class and vendor.

At this writing, the price of a single issue is $6, from Computermat, Box 1664, Lake Havasu, AZ 86403. As the size of the publication increases, due to more and more available programs, don't be surprised if the price also increases.

The directory is published in the spring, summer and fall. The Fall 1979 issue is expected to contain over 5,000 listings. When the directory was first published, a subscription price of $12 a year was set. However, according to a note from Computermat, "We have decided to discontinue the subscriptions. Most of our orders are for a single issue."

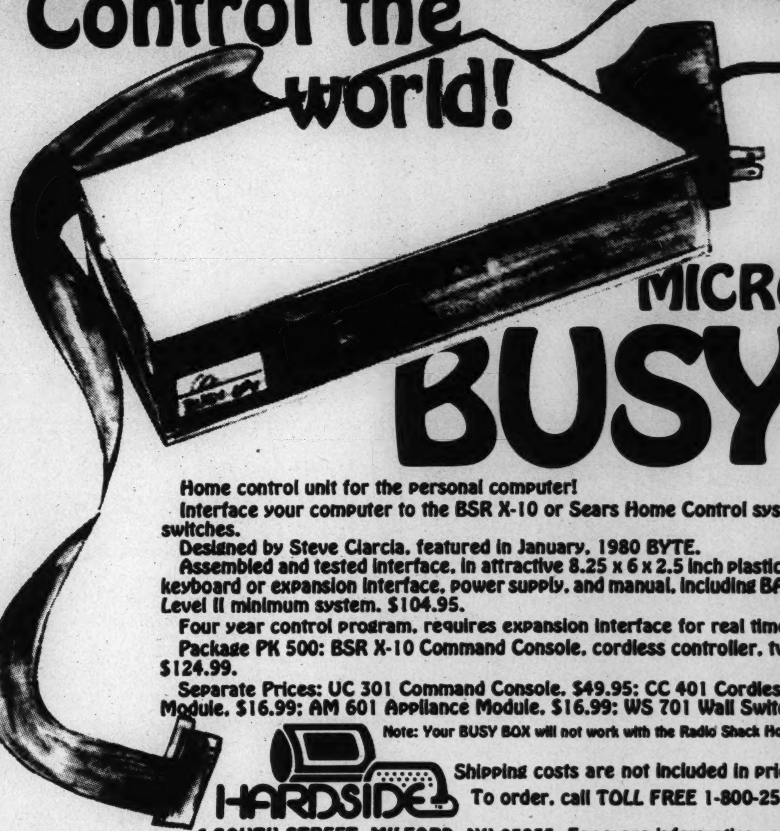
The directory is well worth the $6 for anybody interested in buying more than just an occasional TRS-80 program. But there's one problem with the listings that may be unsolvable. Some programs are listed more than once. When there are three listings for "Library 100," most of us know that's The Bottom Shelf set of programs available from TBS and two others.

But what about the seven listings of Biorhythm, nine of Renumber, and 21 of Inventory? How many are duplicates? How can you decide which to order from the vendor? The cheapest one? Biorhythm ranges from $3 to $9.95, and Renumber from $9.95 to $20 on cassette. So what do you do, pick a price in the middle and hope for the best?

The Summer 1979 directory includes a "software review" questionnaire asking for detailed information from readers on programs. Computermat intends to "compile the results and print them in the next issue." That may help, at least for those programs for which reviews are received, but which may be for only a small percentage of the thousands of programs available.

Well, it's a start, and we can only wish Computermat well, with what is a very large undertaking: collating the information in all those reviews. That is, if altruistic readers send them in. □

Control the world!



MICRO MINT
BUSY BOX

Home control unit for the personal computer!

Interface your computer to the BSR X-10 or Sears Home Control system and control appliances, lamps, and wall switches.

Designed by Steve Ciarcia, featured in January, 1980 BYTE.

Assembled and tested interface, in attractive 8.25 x 6 x 2.5 inch plastic case, with cable and connector for TRS-80* keyboard or expansion interface, power supply, and manual, including BASIC listing for simple control routine for 4K, Level II minimum system. $104.95.

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Package PK 500: BSR X-10 Command Console, cordless controller, two lamp modules and one appliance module. $124.99.

Separate Prices: UC 301 Command Console, $49.95; CC 401 Cordless Remote Controller, $24.99; LM 501 Lamp Module, $16.99; AM 601 Appliance Module, $16.99; WS 701 Wall Switch Module, $16.99.

Note: Your BUSY BOX will not work with the Radio Shack Home Controller, a stripped down version of the BSR X-10.

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Shipping costs are not included in prices.

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6 SOUTH STREET, MILFORD, NH 03055 For more information, call (603)673-5144.

TRS-80* COMPUTERS:

		OUR PRICE
Level I, 4K	$499.00	$449.00
Level II, 4K	$619.00	$559.00
Level II, 16K, no keypad		$669.00
Level II, 16K, w/keypad	$849.00	$769.00

EXPANSION INTERFACES:

Exp. Int., no RAM	$299.00	$269.00
Exp. Int., 16K RAM, (NEC)	$448.00	$369.00
Exp. Int., 32K RAM, (NEC)	$597.00	$459.00

DISK DRIVES:

Percom, TFD-100, 40-tracks	$399.00	$389.00
Percom, Dual TFD-100's	$795.00	$775.00
Percom, TFD-200, 77-tracks	$675.00	$625.00
Percom, Dual TFD-200's	$1350.00	$1250.00

DISK DRIVE ACESSORIES:

2-drive cable for TRS-80*	$29.95	$29.00
4-drive cable for TRS-80*	$39.95	$39.00
Percom Data Separator		$29.95
Extender Card	$15.95	$15.00

We Buy and Sell Used TRS-80*

PRINTERS:

		OUR PRICE
Centronics 730	$999.00	$846.00
Centronics 753-2	$3196.00	$2750.00
Centronics 779-2	$1559.00	$1064.00
RS Quick Printer II	$219.00	$197.00
RS Line Printer III	$1960.00	$1813.00
LRC 7000+(20,32 or 40 col.)	$389.	$369.00
LRC 7000+(64 column)	$405.00	$389.00

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Novation CAT Modem	$199.95	$179.00
RS-232-C Interface Board	$99.00	$89.00
TRS-232 Printer Interface		$49.95
Data Dubber		$49.95
16K Memory Upgrade Kit, Keyboard		$99.00
16K Memory Upgrade Kit, E.I.		$95.00
Percom Electric Crayon		$249.95
Busy Box		$104.95

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CIRCLE 221 ON READER SERVICE CARD

*TRS-80 is a trademark of Radio Shack and Tandy Corp.

Compleat Computer Catalogue

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COMPUTERS

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The Centurion 8-bit microcomputer is built around Intel's 8085A-2 microprocessor, which has a processing speed of 5 MHz, but system speed is 7MHz because a floating point math chip is used to handle number-crunching calculations.

Designed to be a complete, integrated system, the Centurion features 16K of internal PROM, 64K of RAM, a floppy disk controller, CP/M operating system, built on Artec's shielded motherboard. It operates with a CRT terminal and up to four single-sided, double-density, 8-inch floppy disk drives, and is compatible with any printer having an RS-232 interface.

The single-quantity price of the Centurion I with a Hazeltine 1500 CRT terminal is $10,825.

Artec Electronics, 605 Old County Rd., San Carlos, CA 90470. (415) 592-2740.

CIRCLE 250 ON READER SERVICE CARD

CLUSTERSHARED MICROCOMPUTER SYSTEM

Nestar Systems announces a new Clustershared personal computer system with the introduction of the Cluster/One, Model A for the Apple. Now, up to 64 Apple II computers may be tied together in a local network.

Users may communicate with one another, share data, and access the same files, while the individual computer remains free to tackle accounting or scientific problem solving without being tied down by other computers in the system.

Professional and business offices as well as departments within large firms can take advantage of a Clustershared system, typically consisting of multiple Apple II computers, the Nestar Cluster/One, Model A, and shared resources such as printers, data recorders, plotters or graphics tablets.

The Nestar Cluster/One, Model A will be priced at $6,000 for the basic system with 1,260,000 bytes of storage. The optional 16.5 and 33 Mb hard disk systems will cost $8,000 and $10,000 respectively. A ClusterBus communication card, priced at $400, is required for each user station on the network. The cost of the Apple II personal computers are separate and must be added into the total network price.

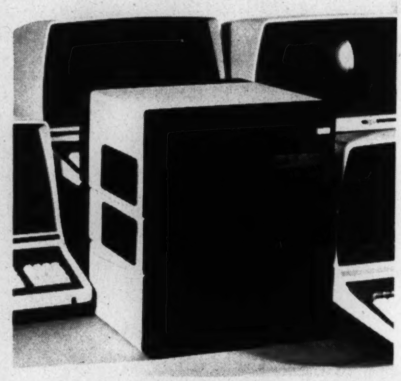
Nestar Systems, Incorporated, 430 Sherman Ave., Palo Alto, CA 94306. (415) 327-0125.

CIRCLE 251 ON READER SERVICE CARD

MULTIVISION FAMILY FROM ADDS

Applied Digital Data Systems Inc., (ADDS), Hauppauge, N.Y. is the world's largest supplier of display terminals to original equipment manufacturers. More than 25% of all displays shipped to OEMs are made by ADDS. The company also produces programmable terminals, clustered terminals and small business computer systems.

ADDS has now introduced a family of modular small business computers including hard disk storage and multi-user capability. The ADDS Multivision 1 entry level computer lists for $3785 and includes a 5 MHz processor, 64K byte RAM, and 700K bytes of dual mini-floppy based storage.



ADDS has developed a CP/M*-compatible, multi-user operating system that supports the Microsoft BASIC Interpreter and Compiler, a proprietary word processing package, five business application packages and a powerful ISAM capability.

For users requiring more data storage, an 8-inch Winchester disk drive is available. Option 1 provides 5M bytes of storage while Option 2 provides 10M bytes. The unit measures a compact 15″ square by 6″ high.

Multivision 3 permits the simultaneous operation of as many as four display terminals. Multivision 2 systems can be field upgraded to Multivision 3 with the addition of an expansion box that supports a 4 port adapter end up to three additional 64K byte RAM boards, yielding a system total of 256K bytes of memory.

A new file type has been added to standard CP/M* file system to provide efficient access to the Winchester disk. The software includes both a BASIC Interpreter and a BASIC Compiler. The Interpreter permits easy development of software; where-

NEW PRODUCTS!

Super Color S-100 Video Kit $99.95

Expandable to 256 x 192 high resolution color graphics. 6847 with all display modes computer controlled. Memory mapped. 1K RAM expandable to 6K. S-100 bus 1802, 8080, 8085, Z80 etc.

Gremlin Color Video Kit $59.95

32 x 16 alpha/numerics and graphics; up to 8 colors with 6847 chip; 1K RAM at E000. Plugs into Super Elf 44 pin bus. Not expandable to high resolution Graphics.

Elf II Adapter Kit $24.50

Plugs into Elf II providing Super Elf 44 and 50 pin bus plus S-100 bus expansion (With Super Expansion). High and low address displays, state and mode LED's optional **$18.00.**

1802 16K Dynamic RAM Kit $149.00

1802/S-100 expandable to 32K, Hidden refresh w/clocks up to 4 MHz w/no wait states Addl. 16K RAM **$79.00.**

Quest Super Basic

Quest, the leader in inexpensive 1802 systems announces another first. Quest is the first company worldwide to ship a **full size Basic** for 1802 systems. A complete function **Super Basic** by **Ron Cenker** including floating point capability with scientific notation (number range ±.17E³⁸), 32 bit integer ±2 billion; Multi dim arrays; String arrays; String manipulation; Cassette I/O, Save and load, Basic, Data and machine language programs; and over 75 Statements, Functions and Operators.

Easily adaptable on most 1802 systems. Requires 12K RAM minimum for Basic and user programs. Cassette version in stock now. ROM versions coming soon with exchange privilege allowing some credit for cassette version.

Super Basic on Cassette **$40.00**

Tom Pittman's 1802 Tiny Basic Source listing now available. Find out how Tom Pittman wrote Tiny Basic and how to get the most out of it. Never offered before. **$19.00**

S-100 4-Slot Expansion **$ 9.95**

Super Monitor VI.I Source Listing **$15.00**

Coming Soon: Assembler, Editor, Disassembler, DA/AD, Super Sound/Music, EPROM programmer, Stringy Floppy Disc System.

QUEST SUPER ELF
SUPER ELF

RCA Cosmac Super Elf Computer $106.95

Compare features before you decide to buy any other computer. There is no other computer on the market today that has all the desirable benefits of the **Super Elf** for so little money. The Super Elf is a small single board computer that does many **big** things. It is an excellent computer for training and for learning programming with its machine language and yet it is easily **expanded with additional memory, Full Basic, ASCII Keyboards, video character generation, etc.**

Before you buy another small computer, see if it includes the following features: ROM monitor; State and Mode displays; Single step; Optional address displays; Power Supply; Audio Amplifier and Speaker; Fully socketed for all IC's; Real cost of in warranty repairs; Full documentation.

The **Super Elf** includes a **ROM** monitor for program loading, editing and execution with **SINGLE STEP for program debugging** which is not included in others at the same price. With **SINGLE STEP** you can see the microprocessor chip operating with the **unique Quest** address and data bus displays **before, during** and **after** executing instructions. Also, CPU mode and instruction cycle are decoded and displayed on 8 LED indicators.

An RCA 1861 **video graphics** chip allows you to connect to your own TV with an inexpensive video modulator to do graphics and games. There is a **speaker system** included for writing your own music or using many music programs already written. The speaker amplifier may also be used to drive relays for control purposes.

A 24 key **HEX keyboard** includes 16 HEX keys plus **load, reset, run, wait, input, memory protect, monitor select** and **single step**. Large, on board displays provide output and optional **high and low address**. There is a 44 pin standard connector slot for PC cards and a 50 pin connector slot for the Quest Super Expansion Board. Power supply and sockets for **all** IC's are included in the price plus a detailed 127 pg. instruction manual which now includes over 40 pgs. of software info. including a series of lessons to help get you started and a music program and graphics target game. Many schools and universities are using the Super Elf as a course of study. OEM's use it for training and R&D.

Remember, other computers only offer Super Elf features at additional cost or not at all. **Compare before you buy. Super Elf Kit $106.95, High address option $8.95, Low address option $9.95. Custom Cabinet** with drilled and labelled plexiglass front panel **$24.95.** Expansion Cabinet with room for 4 S-100 boards **$41.00. NiCad Battery Memory Saver Kit $6.95.** All kits and options also completely assembled and tested.

Questdata, a 12 page monthly software publication for 1802 computer users is available by subscription for $12.00 per year. Issues 1-12 bound $16.50.

Tiny Basic Cassette **$10.00,** on ROM **$38.00,** original Elf kit board **$14.95. 1802 software;** Moews Video Graphics **$3.50.** Games and Music **$3.00,** Chip 8 Interpreter **$5.50.**

Super Expansion Board with Cassette Interface $89.95

This is truly an astounding value! This board has been designed to allow **you** to decide how you want it optioned. **The Super Expansion Board comes with 4K of low power RAM** fully addressable anywhere in 64K with built-in memory protect and a **cassette interface**. Provisions have been made for all other options on the same board and it fits neatly into the hardwood cabinet alongside the **Super Elf**. The board includes slots for up to 6K of **EPROM** (2708, 2758, 2716 or TI 2716) and is **fully socketed.** EPROM can be used for the monitor and Tiny Basic or other purposes.

A 1K Super ROM Monitor $19.95 is available as an on board option in 2708 EPROM which has been preprogrammed with a program loader/editor and error checking multi file cassette read/write software, (relocatible cassette file) another exclusive from Quest. It includes register save and readout, block move capability and video graphics driver with blinking cursor. Break points can be used with the register save feature to isolate program bugs quickly, then follow with single step. The Super Monitor is written with subroutines allowing users to take advantage of monitor functions simply by calling them up. Improvements and revisions are easily done with the monitor. If you have the **Super Expansion Board** and **Super Monitor** the monitor is up and running at the push of a button.

Other on board options include **Parallel Input and Output Ports** with **full handshake**. They allow easy connection of an ASCII keyboard to the input port. **RS 232 and 20 ma Current Loop** for teletype or other device are on board and if you need more memory there are two **S-100** slots for static RAM or video boards. Also a 1K Super Monitor version 2 with video driver for full capability display with Tiny Basic and a video interface board. **Parallel I/O Ports $9.85, RS 232 $4.50, TTY 20 ma I/F $1.95, S-100 $4.50.** A **50 pin connector set** with ribbon cable is available at $15.25 for easy connection between the **Super Elf** and the **Super Expansion Board.**

Power Supply Kit for the complete system (see Multi-volt Power Supply below).

P.O. Box 4430A, Santa Clara, CA 95054
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7445N	.69
7447N	.60
7448N	.69
7450N	.18
7474N	.35
7475N	.49
7485N	.88
7489N	1.85
7490N	.43
7492N	.43
7493N	.43
7495N	.69
74100N	.90
74107N	.35
74121N	.34
74123N	.59
74125N	.45
74145N	.69
74150N	.95
74151N	.69
74154N	1.00
74157N	.69
74161N	.87
74162N	.87
74163N	.87
74174N	.96
74175N	.90
74190N	1.15
74192N	.87
74193N	.85
74221N	2.00
74298N	1.65
74365N	.66
74366N	.66
74367N	.66

74LS00 TTL

74LS00N	.35
74LS02N	.35
74LS04N	.35
74LS05N	.35
74LS08N	.35
74LS10N	.35
74LS13N	.55
74LS14N	1.10
74LS20N	.35
74LS22N	.35
74LS28N	.41
74LS30N	.35
74LS33N	.75
74LS38N	.55
74LS74N	1.25
74LS75N	1.00
74LS90N	.85
74LS93N	.70
74LS95N	1.10
74LS107N	.45
74LS112N	.45
74LS113N	.35
74LS132N	.89
74LS136N	.45
74LS151N	.85
74LS155N	.85
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LM339N	1.55
LM340K-5	1.35
LM340K-8	1.35
LM340K-12	1.35
LM340K-15	1.35
LM340K-24	1.35
LM340T-5	1.25
LM340T-8	1.25
LM340T-12	1.25
LM340T-15	1.25
LM340T-18	1.25
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CD4013	.39
CD4014	1.00
CD4015	1.00
CD4016	.45
CD4017	1.05
CD4018	.94
CD4019	.45
CD4020	1.02
CD4021	1.25
CD4022	1.10
CD4023	.28
CD4024	.75
CD4025	.28
CD4026	2.00
CD4027	.66
CD4028	.85
CD4029	1.02
CD4030	.45
CD4035	1.02
CD4040	1.02
CD4042	.85
CD4043	.85
CD4044	.85
CD4046	1.67
CD4049	.45
CD4050	.49
CD4051	1.13
CD4060	1.42
CD4066	.71
CD4068	.40
CD4069	.40
CD4070	.50
CD4071	.28
CD4072	.28
CD4073	.28
CD4075	.28
CD4076	1.45
CD4078	.40
CD4081	.28
CD4082	.28
CD4116	.47
CD4490	5.50
CD4507	1.00
CD4508	4.25
CD4510	1.02
CD4511	.94
CD4515	2.52
CD4516	1.10
CD4518	1.02
CD4520	1.02
CD4527	1.51
CD4528	.79
CD4553	3.50
CD4566	2.25
CD4583	4.50
CD4585	1.10
CD40192	3.00
74C00	.28
74C04	.40
74C10	.28
74C14	2.10
74C20	.28
74C30	.28
74C48	1.95
74C74	.75
74C76	1.40
74C90	1.15
74C93	1.40
74C154	3.00
74C160	1.44
74C175	1.35
74C192	1.65
74C221	2.00
74C905	6.00
74C906	.75
74C914	1.95
74C922	5.50
74C923	5.50
74C925	6.95
74C926	6.95
74C927	6.95

INTERFACE

8095	.65
8096	.65
8097	.65
8098	.65
8T09	1.25
8T10	4.50
8T13	3.00
8T20	5.50
8T23	3.10
8T24	3.50
8T25	3.20
8T26	1.69
8T28	2.75
8T97	1.69
8T98	1.69

MOS/MEMORY RAM

2101-1	3.95
2102-1	.95
2102AL-4	1.25
2102AN-2L	1.60
21L02-1	1.18
2104A-4	4.95
2107B-6	3.75
2111-1	3.75
2112-2	3.95
2114L 300ns	7.40
4116 200ns	9.50
8/4116 200ns	64.00
2513B	6.30
MM5262	.40
MM5280	3.00
MM5320	9.95
MM5330	5.94
PD411D-3	4.00
PD411D-4	5.00
P5101L	8.95
4200A	9.95
82S25	2.90
91L02A	1.50
HD0165-5	6.95
MM57100	4.50
GIAY38500-1	9.95
MCM66751A	9.95
9368	3.50
410D	10.00
416	16.00

CLOCKS

MM5311	5.50
MM5312	3.90
MM5314	3.90
MM5369	2.10
MM5841	14.45
MM5865	7.95
CT7001	5.80
CT7010	8.95
CT7015	8.95
MM5375AA/N	3.90
MM5375AG/N	4.90
7205	16.50
7207	7.50
7208	15.95
7209	4.95
DS0026CN	3.75
DS0056CN	3.75
MM53104	2.50

MICROPROCESSOR

6502	12.50
6504	16.50
6522	13.60
6800	17.50
6802	18.75
6820	9.95
6850	12.95
8080A	[illegible]
8085	27.10
8086	75.00
Z80	14.75
Z80A	19.75
8212	2.90
8214	8.00
8216	2.90
8224	2.90
8228	5.35
8251	8.50
8253	15.00
8255	9.25
8257	19.50
8259	19.50
1802CP plas.	13.95
1802DP plas.	17.95
1861P	11.50
CDP1802CD	19.95
CDP1802D	25.00
CDP1861	12.95

UART/FIFO

AY5-1013	5.50
AY5-1014	7.50
3341	6.95

PROM

1702A	3.95
2513B upper case	6.95
2708	7.75
2716T1	24.50
2716 Intel	34.95
8/2716 Intel	240.00
2732	85.00
2758	22.50
8741A	85.00
8748	75.00
8748-8	70.00
8755A	65.00
N82S23	2.95
N82S123	3.50
N82S126	3.75
N82S129	3.75
N82S131	3.75
N82S136	8.75
N82S137	8.75
DM8577	2.90
8223	2.90
8/2716 Intel	240.00

CONNECTORS

30 pin edge	2.50
44 pin edge	2.75
100 pin edge	4.50
100 pin edge WW	5.25

IC SOCKETS

Solder Tin Low Profile

PIN	1UP	PIN	1UP
8	.15	22	.30
14	.14	24	.35
16	.16	28	.42
18	.27	36	.58
20	.29	40	.57

2 level 14 pin ww .20

WIRE WRAP LEVEL 3

PIN		PIN	
14	.32	24	.86
16	.33	28	1.00
18	.57	40	1.23

CRYSTALS

1 MHz	4.50
2 MHz	4.50
4 MHz	4.25
5 MHz	4.25
10 MHz	4.25
18 MHz	3.90
20 MHz	3.90
32 MHz	3.90
32768 Hz	4.00
1.8432 MHz	4.50
3.5795 MHz	1.20
2.0100 MHz	1.95
2.097152 MHz	4.50
2.4576 MHz	4.50
3.2768 MHz	4.50
5.0688 MHz	4.50
5.185 MHz	4.50
5.7143 MHz	4.50
6.5536 MHz	4.50
14.31818 MHz	4.25
18.432 MHz	4.50
22.1184 MHz	4.50

KEYBOARD ENCODERS

AY5-2376	$12.50
AY5-3600	17.95
AY5-9100	10.50
AY5-9200	16.50
74C922	5.50
74C923	5.50
HD0165-5	6.95

D Connectors RS232

DB25P	2.95
DB25S	3.95
Cover	1.50
RS232 Complete Set	6.50
DE9S	1.95
DA15P	2.10
DA15S	3.10

Hickok 3½ Digit LED multimeter	**69.95**
Stopwatch Kit	**26.95**
Auto Clock Kit	**17.95**

Not a Cheap Clock Kit $14.95
Includes everything except case, 2-PC boards. 6-.50" LED Displays. 5314 clock chip. transformer, all components and full instructions. Orange displays also avail. **Same kit w/.80" displays.** Red only. **$21.95 Case $11.75**

8K/16K Eprom Kit (less PROMS)	$89.00
Motherboard	$39.00
Extender Board	$8.99

RESISTORS ¼ watt 5%
10 per type .03 1000 per type .012
25 per type .025 350 piece pack
100 per type .015 5 per type 6.75
½ watt 5% per type .05

KEYBOARDS

56 key ASCII keyboard kit	$67.50
Fully assembled	77.50
53 key ASCII keyboard kit	60.00
Fully assembled	70.00
Enclosure	14.95
Metal Enclosure	29.95

LEDS

Red T018	.15
Green, Yellow T018	.20
Jumbo Red	.20
Green, Orange, Yellow Jumbo	.25
Cliplite LED Mounting Clips	8/$1.25

(specify red, amber, green, yellow, clear)

CONTINENTAL SPECIALTIES in stock
Complete line of breadboard test equip.
MAX-100 8 digit Freq. Ctr. $129.95

OK WIRE WRAP TOOLS in stock
Portable Multimeter $18.90

SPECIAL PRODUCTS

MM5865 Stopwatch Timer with 10 pg. spec.	9.00
PC board	7.50
Switches Mom. Pushbutton	.27
3 pos. slide	.25
Encoder HD0165-5	6.95
Paratronics 100A Logic Analyzer Kit	**$224.00**
Model 10 Trigger Expander Kit	$229.00
Model 150 Bus Grabber Kit	$369.00
Sinclair 3½ Digit Multimeter	**$59.95**
Clock Calendar Kit	**$23.95**
2.5 MHz Frequency Counter Kit	**$37.50**
30 MHz Frequency Counter Kit	**$47.75**

TRANSFORMERS

6V 300 ma	3.25
12 Volt 300 ma transformer	1.25
12.6V CT 600 ma	3.75
12V 250 ma wall plug	2.95
12V CT 250 ma wall plug	3.50
24V CT 400 ma	3.95
10V 1.2 amp wall plug	4.85
12V 6 amp	12.95
12V 500 ma wall plug	4.75
12V 1 amp wall plug	6.50
12V 3 amp	8.50
10/15 VAC 8/16 VA wall plug	9.75

DISPLAY LEDS

MAN1	CA	.270	2.90
MAN3	CC	.125	.39
MAN72/74	CA/CA	.300	1.00
DL704	CC	.300	1.25
DL707/DL707R	CA	.300	1.00
DL727/728	CA/CC	.500	1.90
DL747/750	CA/CC	.600	1.95
DL750	CC	.600	1.95
FND359	CC	.357	.70
FND500/507	CC/CA	.500	1.35
FND503/510	CC/CA	.500	.90
FND800/807	CC/CA	.800	2.20
3 digit Bubble			.60
4 digit Bubble			.80
DG8 Fluorescent			1.75
DG10 Fluorescent			1.75
5 digit 14 pin display			1.00
10 digit display			1.25
7520 Clairex photocells			.39
TIL311 Hex			9.50
MAN3640	CC	.30	1.10
MAN4610	CA	.40	1.20
MAN4640	CC	.40	1.20
MAN4710	CA	.40	.95
MAN4740	CC	.40	1.20
MAN6640	CC	.56	2.95
MAN6710	CA	.60	1.35
MAN6740	CC	.60	1.35

MA1002A	**8.95**
MA1002E	**8.95**
MA1012A	**8.95**
102P3 transformer	**2.25**

ROCKWELL AIM 65 Computer

6502 based single board with full ASCII keyboard and 20 column thermal printer. 20 char. alphanumeric display, ROM monitor, fully expandable. $375.00. 4K version $450.00. 4K Assembler $85.00, 8K Basic Interpreter $100.00.

Special small power supply for AIM65 assem. in frame **$49.00.** Complete AIM65 in thin briefcase with power supply **$485.00.** Molded plastic enclosure to fit AIM65 plus power supply **$47.50.** Special Package Price: 4K AIM, 8K Basic, power supply, cabinet **$599.00**

AIM65/KIM/VIM/Super Elf 44 pin expansion board; 3 female and 1 male bus. Board plus 3 connectors **$22.95.**

AIM65/KIM/VIM I/O Expansion Kit; 4 parallel and 2 serial ports plus 2 internal timers **$39.00.** PROM programmer for 2716 **$150.00.**

Multi-volt Computer Power Supply

8v 5 amp, ±18v .5 amp, 5v 1.5 amp, −5v .5 amp, 12v .5 amp, −12 option. ±5v, ±12v are regulated. Kit $29.95. Kit with punched frame $37.45, $4.00 shipping. Kit of hardware $14.00. Woodgrain case $10.00, $1.50 shipping.

PROM Eraser Will erase 25 PROMs in 15 minutes. Ultraviolet, assembled **$37.50**
Safety switch/Timer version **$69.50**

60 Hz Crystal Time Base Kit $4.40

Converts digital clocks from AC line frequency to crystal time base. Outstanding accuracy.

NiCad Battery Fixer/Charger Kit

Opens shorted cells that won't hold a charge and then charges them up, all in one kit w/full parts and instructions. **$7.25**

LRC 7000+Printer $389.00

40/64 column dot matrix impact, std. paper. Interface all personal computers.

Televideo Terminal $845.00

102 key, upper, lowercase, 10 Baud rates 24 x 80 char. microprocessor cont. edit. cap.

Intertube II Terminal $874.00

Super Brain

Floppy Disk Terminal $2895.00

79 IC Update Master Manual $29.95

Complete IC data selector, 2500 pg. master reference guide. Over 50,000 cross references. Free update service through 1979. Domestic postage $3.50. No foreign orders.

S-100 Computer Boards

8K Static RAM Kit	$135.00
16K Static RAM Kit	265.00
24K Static RAM Kit	423.00
32K Static RAM Kit	475.00
16K Dynamic RAM Kit	199.00
32K Dynamic RAM Kit	310.00
64K Dynamic RAM Kit	470.00
Video Interface Kit	**$129.00**

Video Modulator Kit $8.95

Convert TV set into a high quality monitor w/o affecting usage. Comp. kit w/full instruc.

Digital Temp. Meter Kit $34.00

Indoor and outdoor. Switches back and forth. Beautiful. 50" LED readouts. Nothing like it available. Needs no additional parts for complete, full operation. Will measure −100° to +200°F, tenths of a degree, air or liquid. Beautiful woodgrain case w/bezel **$11.75**

TERMS: $5.00 min. order U.S. Funds. Calif residents add 6% tax.
BankAmericard and Master Charge accepted.
Shipping charges will be added on charge cards.

FREE: Send for your copy of our NEW 1980 QUEST CATALOG. Include 28¢ stamp.

as for running programs the Compiler is three to four times faster than the Interpreter. Single key and multi key ISAM provide quick access to data stored on the Winchester disk.

Five accounting software packages are available: payroll, general ledger, accounts receivable and payable, and inventory. Multivision 3 measures 15 inches square by 18 inches.

The list price schedule of Multivision is as follows:

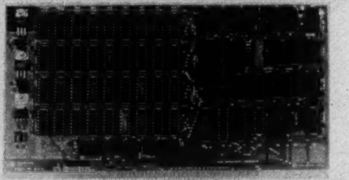
Multivision 1 — $3785.00
Multivision 2 (5M byte option) — $7995.00
Multivision 3 (256K bytes, 4 display ports, 1 printer port) — $12,885.00.

Applied Digital Data Systems, Inc., 100 Marcus Blvd., Hauppauge, NY 11787. (516) 231-5400.

CIRCLE 252 ON READER SERVICE CARD

64K MEMORY BOARD

The Model 460 64K Byte Dynamic RAM Memory Board, a high-speed low-power memory system, available from Industrial Micro Systems, provides 64K bytes of memory organized into four blocks, each of which is individually deselectable under program control for memory mapping.



The parity feature of Model 460 provides increased data security. In the event of an error, a parity bit is set which lights an LED on the board and may be used to set a vectored interrupt or halt the CPU. The Model 460 also supports 8080 or Z80 CPU's and operates at 4 MHz with no wait states.

Industrial Micro Systems, Inc., 628 Eckhoff St., Orange, CA 92668. (714) 978-6966.

CIRCLE 253 ON READER SERVICE CARD

Terminals & I/O

PASCAL TERMINAL

The ACI Pascal Video terminal is a twelve-inch CRT (24 lines by 80 characters) for use with the UCSD Pascal Operating System or other applications requiring simular video terminal capabilities.

PASCAL TERMINAL

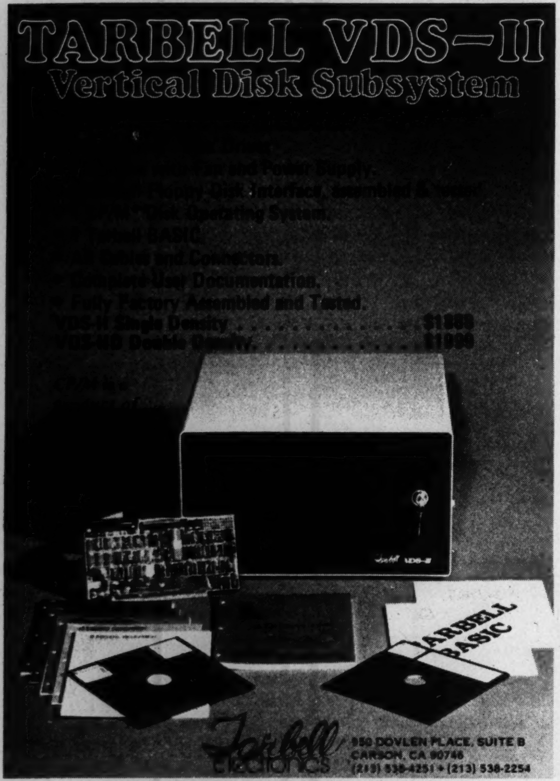
It provides standard upper/lower case 96 ASCII character set and it accommodates several international language character displays (USA, UK, French, German, Spanish, Danish/Norwegian and Swedish/Finnish) by internal switch changes.

Associated Computer Industries, Inc., 17751 Sky Park East, Suite G, Irvine, CA 92714. (714) 557-0560.

CIRCLE 254 ON READER SERVICE CARD

Z8-BASED CRT

Micro Application Systems announces miniMas 2, the second member of its Z8-based CRT family designed for large volume applications.

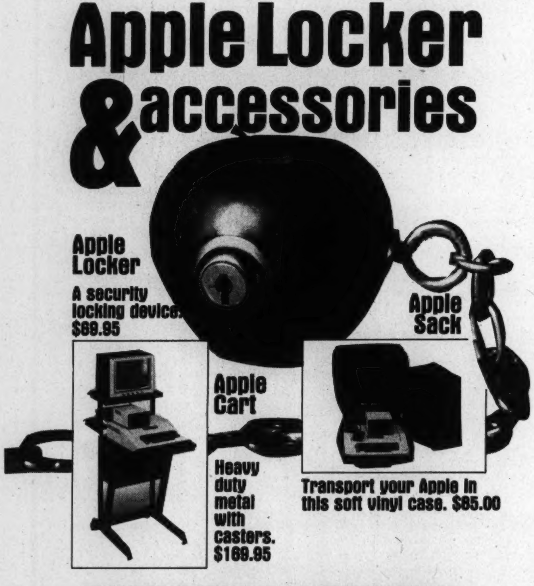


TARBELL VDS—II
Vertical Disk Subsystem

[illegible] and Power Supply.
[illegible] Floppy Disk Interface, assembled & tested.
[illegible] Disk Operating System.
[illegible] BASIC.
[illegible] Cables and Connectors.
Complete User Documentation.
Fully Factory Assembled and Tested.
VDS-II Single Density $1888
VDS-IID Double Density $1999

Tarbell electronics
950 DOVLEN PLACE, SUITE B
CARSON, CA 90746
(213) 538-4251 • (213) 538-2254

CIRCLE 205 ON READER SERVICE CARD



Apple Locker & accessories

Apple Locker
A security locking device. $69.95

Apple Sack
Transport your Apple in this soft vinyl case. $85.00

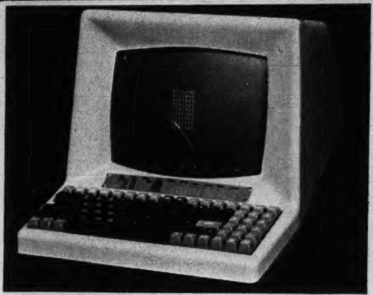
Apple Cart
Heavy duty metal with casters. $169.95

FOR MORE INFORMATION AND ORDERS CONTACT:

TELE-TERMINALS

7216 BOONE AVE. NORTH
BROOKLYN PARK, MN 55428
PHONE: (612) 535-5330
MN Wats 800/442-3006
NAT Wats 800/328-3072

CIRCLE 218 ON READER SERVICE CARD



Standard hardware features include: 12″ CRT, 7 x 9 dot matrix in a 9 x 13 field displaying all 128 ASCII codes, and 24 lines of 39 or 80 characters. Numeric pad, cursor and editing function keys, and reset key to terminate undesired action are also standard.

Standard software features include: page or scoll mode, transmit line or page unprotected only or all data with space suppression, new line mode, remote keyboard lock/unlock, erase from cursor to end of line or screen, and protected field mode in conjunction with any combination of attributes. List price is $888 with one page of memory and $959 with two pages of memory.

Micro Application Systems, Inc., 5575 North County Road 18, Minneapolis, MN 55442. (612) 559-0320.

BLACK AND WHITE MONITOR

Leedex Corporation has announced a 12″ black and white monitor, the Video 100-80.

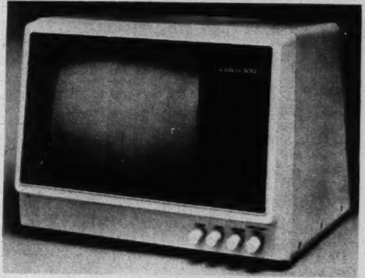
The removable face plate provides mounting space for a mini floppy disk, and there is space inside the cabinet for an 11″ x 14″ PC board for custom designed controller electronics.

The 90° deflection picture tube allows an 80-character by 24-line display, and the 12 MHz band width provides crisp, well-defined characters.

It features plug-in compatibility with Apple, Atari, Radio Shack, O.S.I., Microterm, and Exidy. $199.

Leedex Corporation, 2300 East Higgins Rd., Elk Grove Village, IL 60007. (312) 364-1180.

CIRCLE 255 ON READER SERVICE CARD



SMART CRT TERMINALS

TeleVideo, Inc. has introduced four smart, microprocessor-controlled CRT terminals, the 912B and 912C and the 920B and 920C.

Included as standard in all models are: upper and lower case, a printer/extension port, an imbedded numeric pad, remote computer control, selectable transmission rates from 75-9600 baud, and a host of editing and special functions. A serial RS-232C communications interface and 20 mA current loop are also standard features.

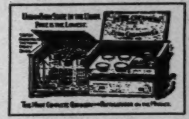
The terminals' non-glare, 12-inch diagonal CRT screens provide 12x10 dot matrix resolution and dual intensity for 1920 characters. A full 96-character ASCII set is displayed, in a 24-line by 80-characters/line format. Prices range from $875 to $1030.

TeleVideo, Inc., 3190 Coronado Dr., Santa Clara, CA 95051. (408) 246-5428.

CIRCLE 256 ON READER SERVICE CARD

Salesmen, Canvassers and Implement Dealers

Earn Large Profits with Small Capital



Sold the Entire Year to all Classes Strictly High-Class Goods

Ask for our circulars with prices · No goods sold direct · Secure territory

ZERO CREAMERY CO. - Peru, Ind.

MICRO BEEP™

ADDS SOUND TO YOUR

TRS-80™!

MAKES GAMES MORE INTERESTING

BEEPS ON ERRORS • AT END OF A SORT • AFTER PRINTING • WHENEVER YOU WANT!

SIMPLE HOOK UP: Just plug remote jack from cassette into unit.

EASILY CONTROLLED FROM BASIC:

OUT 255,4 = ON
OUT 255,0 = OFF

24 HOUR HOTLINE • VISA OR MASTER CHARGE • COD • 602—882-3948

PLEASE SEND ________MICRO BEEPS
@$9.95 Ea. Plus $2.50 (Per Order) — Postage & Handling
Az. Residents add 6% Sales Tax
☐ Check ☐ Money Order ☐ VISA ☐ MC ☐ C.O.D. ($3.50 extra)
Account No.________________
Expiration Date: ________________
WORKS ON ANY MODEL ONE TRS-80

Name ________________
Address ________________
City ________________
State ________________ Zip ______

SIMUTEK BOX 35298 TUCSON, AZ 85740

CIRCLE 193 ON READER SERVICE CARD

STOP PLAYING GAMES

TRS-80 (Level II)
PET
APPLE
OTHERS

- Calculate odds on HORSE RACES with ANY COMPUTER using **BASIC**.
- SCIENTIFICALLY DERIVED SYSTEM really works. This system was written and used by computer experts and is now being made available to home computer owners. This method is based on storing data from a large number of races on a high speed, large scale computer. 23 factors taken from the "Daily Racing Form" were then analyzed by the computer to see how they influenced race results. From these 23 factors, ten were found to be the most vital in determining winners. NUMERICAL PROBABILITIES of each of these 10 factors were then computed and this forms the basis of this REVOLUTIONARY NEW PROGRAM.
- SIMPLE TO USE: Obtain "Daily Racing Form" the day before the races and answer the 10 questions about each horse. Run the program and your computer will print out the odds for all horses in each race. COMPUTER POWER gives you the advantage!
- YOU GET: 1) TRS-80 (Level II) Cassette
  2) Listing of BASIC program for use with any computer.
  3) Instructions on how to get the needed data from the "Daily Racing Form"
  4) Tips on using the odds generated by the program.
  5) Sample form to simplify entering data for each race.

———————————*MAIL COUPON OR CALL TODAY*———————————

3G COMPANY, INC. DEPT. **(503) 357-9889**
RT. 3, BOX 28A, GASTON, OR 97119

Yes, I want to use my computer for FUN and PROFIT. Please send me ____________ programs at **$19.95 each**.

Enclosed is: ☐ check or money order ☐ Master Charge ☐ Visa

Card No. ________________ Exp. date
NAME ________________
ADDRESS ________________
CITY ____________ STATE ________ ZIP ________

START USING YOUR COMPUTER FOR
FUN and PROFIT!

CIRCLE 207 ON READER SERVICE CARD

Applications Software

RECREATIONAL, GAMES

Five Stones Software announces a **Gomoku** program for North Star Horizon DOS and CP/M based systems. The program, written by the current North American champion, requires a minimum of 32K bytes of RAM and is available on 5¼" diskette for $29.95. Five Stones Software, P.O. Box 1369, Station B, Ottawa, OT, Canada K1P 5R4.

CIRCLE 257 ON READER SERVICE CARD

Four-part music is available for the Sorcerer with a combination package which includes machine language software to generate four voice waveforms, a music editor and hardware which plugs into the parallel port via an RS-232 connector. $40. Howard Arrington, 9522 Linstock, Boise, ID 83704. (208) 377-1938.

CIRCLE 258 ON READER SERVICE CARD

Cyborg Wars for 16K TRS-80 Level II computers positions the players as rulers of a country inhabited by android subjects. $18. Strategem Cybernetics, 2 Washington Square Village, New York, NY 10012.

CIRCLE 259 ON READER SERVICE CARD

International Data Services announces two graphics programs for the TRS-80 Level II. **Microsketch III** is a "graphics drawing/automatic pattern drawing/graphic string creation/big print/automatic circle drawing program" which creates graphic screens which may be saved in memory, on tape, on disk or incorporated into other programs. $7.95. **Freakout** produces keyboard generated "farout" graphics and sound when the user presses the keys. $3.95. International Data Services, 340 West 55th St., New York, NY 10019. (212) 765-8610.

CIRCLE 260 ON READER SERVICE CARD

PERSONAL

Pro-Gress is a program which enables the user to do **multiple regression analysis** on Commodore's PET/CBM machines. It is written in Basic with special consideration given to running time. Cassette, $45; Diskette, $50. Cognitive Products, P.O. Box 2592, Chapel Hill, NC 27514.

CIRCLE 261 ON READER SERVICE CARD

Stock Tracker is a program which analyzes supply and demand factors on individual securities — stocks, options and commodities — and advises the user when to buy and sell. Disk Basic versions are available for the TRS-80 and Apple II or Apple II Plus and require 32K RAM. $150. H & H Trading Company, P.O. Box 23546, Pleasant Hill, CA 94523. (415) 937-1030.

CIRCLE 262 ON READER SERVICE CARD

Income Property Cashflow/Leverage Analysis Program analyzes the effects of insurance, property taxes, utility expenses, interest payments, closing costs and debt service on the total amount of cash necessary for purchase of income property, as well as the total monthly payment. It also calculates the return on investment and the actual leverage achieved based on a user estimated annual appreciation rate. Cassette, $30; diskette, $35. Realty Software Company, 2045 Manhattan Ave., Hermosa Beach, CA 90254. (213) 372-9419.

CIRCLE 263 ON READER SERVICE CARD

Sat Trak International announces three programs that enable a TRS-80, Apple or Sorcerer user to find the geographical location of a satellite, locate it in space in relation to his location anywhere on earth and update its orbital parameters based on a visual or radio observation. Prices range from $20 to $65. Sat Trak International, c/o Computerland of Colorado Springs, 4543 Templeton Gap Rd., Colorado Springs, CO 80909.

CIRCLE 264 ON READER SERVICE CARD

Basic Cat™

A Cat acoustic modem lets your computer talk face to face with any other compatible computer or terminal within reach of your phone. It takes the data you type into your personal computer or terminal and sends it out over standard telephone lines.
It's that simple.

Talk to your office computer from home. Send or receive data from anywhere. Swap programs in Basic, Pascal, Fortran, Cobol or whatever—it doesn't matter to Cat. It's the accurate, reliable, affordable (only $189) modem that talks your language.

Cat by Novation

Tie your computer into the world.

Call for details

(800) 423-5410

In California (213) 996-5060

Available at Hamilton/Avnet, Kierulff Electronics, Byte Shops, Computerland, and your local computer store.

Novation, Inc., 18664 Oxnard Street, Tarzana, California 91356

CIRCLE 171 ON READER SERVICE CARD

WORD PROCESSING

A new version of **EasyWriter** enables the user to create, review, and revise documents on an 80-column upper and lower case Apple II video display. Two additional modules are available to complement the system: **EasyMailer** is a form letter module which automatically inserts information from a name and address file into an EasyWriter text file; **EasyMover** transmits text across common telephone lines to any other Apple computer. Information Unlimited Software, 793 Vincente St., Berkeley, CA 94707. (415) 525-4046.

CIRCLE 265 ON READER SERVICE CARD

WordMagic II is a word processor designed specifically for the TRS-80 Model II. Features include TRS file compatibility, full cursor control and edit capability, paging, printing and automatic page number insertion. $100. CalData Systems, P.O. Box 178446, San Diego, CA 92117.

CIRCLE 266 ON READER SERVICE CARD

Computer Bugs announces a **Text Editor** designed to allow the TRS-80 Model II to be used as a word processor. It requires a 64K system with one disk drive. $39.00. Computer Bugs, P.O. Box 789, Boynton Beach, FL 33435. (305) 737-4738.

CIRCLE 267 ON READER SERVICE CARD

Small Business Systems Group announces the Deluxe **Personal Finance Package** for use on 32K TRS-80 Level II computers with two disks. Among other things, the program will support up to 900 transactions per year in 33 different budget categories, maintain a checking account balance, estimate average monthly expenses and provide up to ten savings account summaries. Small Business Systems Group, Corner Main St. and Lowell Rd., Dunstable, MA 01827. (617) 649-9595.

CIRCLE 268 ON READER SERVICE CARD

Basic to Electric Pencil File Conversion for the TRS-80 Level II converts any Basic program or data file to an Electric Pencil file automatically. It will run under any version of TRSDOS or NEWDOS. $3.95. International Data Services, 340 West 55th St., New York, NY 10019. (215) 765-8610.

CIRCLE 269 ON READER SERVICE CARD

EDUCATIONAL

An educator in San Diego has developed **reading, language arts** and **math** programs for the TRS-80. The programs are designed for use by students in grades one to six. $9.50 and up. Educational Programs, Disney Electronics, 6153 Fairmount Ave., San Diego, CA 92120.

CIRCLE 270 ON READER SERVICE CARD

BUSINESS

An **Inventory Program** for 48K Apple II or Apple II Plus includes the following inventory categories: stock number, description, vendor ID, class, location, reorder point, reorder quantity, cost, selling price, number on order, order date and quantity on hand. All reports may be entered, changed, updated, deleted or viewed. The program is menu-driven and requires two disk drives. $140. Software Technology for Computers, P.O. Box 428, Belmont, MA 02178.

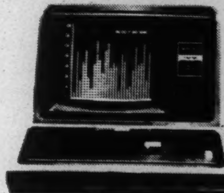
CIRCLE 271 ON READER SERVICE CARD

Systems Software

LANGUAGES

Microsoft announces TRSDOS-compatible versions of their **Cobol and Basic compilers** for the TRS-80 Model II. Both compilers provide complete facilities for commercial or in-house software development, including Microsoft's standard macro assembler and linking loader. Basic compiler, $395; Cobol-80 compiler, $750. Microsoft, 10800 NE Eighth, Suite 819, Bellevue, WA 98004. (206) 455-8080.

CIRCLE 272 ON READER SERVICE CARD



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The **Nevada Cobol** compiler for CP/M based systems is designed specifically for small businesses using microprocessors. $99.95. Ellis Computing, 1480 17th Ave., San Francisco, CA 94122. (415) 664-1534.

CIRCLE 273 ON READER SERVICE CARD

A multi-user Cobol, designed to run on Chieftain small business systems, is available from Smoke Signal Broadcasting. Running under BOS (Business Operating System), it controls all aspects of program development, from initial input of source programs through compilation and testing to the operation of a complete business system. $1700. Smoke Signal Broadcasting, 31336 Via Colinas, Westlake Village, CA 91361.

CIRCLE 274 ON READER SERVICE CARD

A Model I **TRS-80 Fortran** software package makes it possible for the experienced Fortran programmer to write, compile and execute Fortran programs. The package includes a Fortran user's manual, compiler, Fortran-80 and Link-80 reference manuals, Edit-80 user's manual, and a Fortran subroutine library. It requires a Level II TRS-80 with 16K RAM, expansion interface with 16K RAM, and at least one disk drive. $99.95. Available from participating Radio Shack Computer Centers, stores and dealers.

Symbolic/Structured Basic for 8-32K PET computers is a precompiler said to enhance the PET's basic monitor with the addition of extra control statements. S-Basic includes an editor, translator/precompiler and the S-Basic Loader. $35.95. Softside Software, 305 Riverside Dr., New York, NY 10025.

CIRCLE 275 ON READER SERVICE CARD

APL80, an adaptation of APL to the TRS-80, is now available. The 32K disk version includes four workspaces containing lessons on APL for the beginner and the book **APL: An Interactive Approach.** $49.95. A 16K Level II cassette version is available without the lessons or the book. $14.95. The Software Exchange, 6 South St., Box 68, Milford, NH 03055. (800) 258-1790.

CIRCLE 276 ON READER SERVICE CARD

DATA BASE SYSTEMS

Analysis Pad from the Bottom Shelf is a columnar calculator which enables the user to create a 30 x 40 matrix for data entry. The program, which allows the user to create column and row labels, requires 48K. $49.50. The Bottom Shelf, Inc., P.O. Box 49104, Atlanta, GA 30359. (404) 939-6031.

CIRCLE 277 ON READER SERVICE CARD

The **String/80 Bit** is a collection of string and file handling routines specifically designed to operate in the Z80/8080 CP/M environment. The relocatable routines, written in assembler language, utilize the Microsoft Fortran convention of register handling, and are available on 5 or 8-inch CP/M compatible soft sectored floppy disk. $95. Key Bits, Inc., P.O. Box 592293, Miami, FL 33159.

CIRCLE 278 ON READER SERVICE CARD

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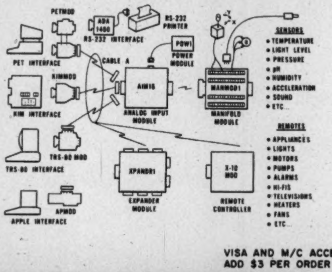

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CIRCLE 136 ON READER SERVICE CARD

Micro Data Base Systems announces a **hierarchical (tree-structure) data base management system** for Z-80, 6502 and 8080 based micro-computers. Written in machine language, the system includes commands to add, delete, update, search and traverse the data base. Z-80 version, $250; 6502 and 8080 versions, $325. Micro Data Base Systems, Inc., P.O. Box 248, Lafayette, IN 47902. (317) 742-7388.

CIRCLE 279 ON READER SERVICE CARD

IDM-M2, an **interactive data manager** for the TRS-80 Model II, features data base initialization, data base manipulation, report writer and report generator. Written in Basic, it requires 64K of memory. $199. Micro Architect, 96 Dothan St., Arlington, MA 02174.

CIRCLE 280 ON READER SERVICE CARD

UTILITIES AND MISCELLANEOUS

Microproducts announces **Applebug**, a programming aid and software debugging tool that assists in developing, debugging and testing machine language code on the Apple II. It will also facilitate tracing the logic of existing machine language programs such as the monitor, DOS and Applesoft. $29.95 on diskette. Microproducts, 2107 Artesia Blvd. Redondo Beach, CA 90278. (213) 374-1673.

CIRCLE 281 ON READER SERVICE CARD

Apple Data-Graph is a hi-res data-graphing program which plots line graphs, dot graphs and scatter plots. Up to three 40-point curves may be plotted on the same co-ordinates with X and Y axes dimensioned. Curves may be saved to disk and recalled for later use. The program requires a 32K Apple with Applesoft ROM and one disk drive. $35. Connecticut Information Systems, Co., 218 Huntington Rd., Bridgeport, CT 06608. (203) 579-0472.

CIRCLE 282 ON READER SERVICE CARD

Line Printer, which requires a 32K TRS-80 with disk and Centronics printer, is designed to upgrade any Basic program that generates printed reports. It has the ability to set aside up to 16K of memory as buffer, enabling the computer to printout as a background task. $24.50. The Bottom Shelf, Inc., P.O. Box 49104, Atlanta, GA 30359. (404) 939-6031.

CIRCLE 283 ON READER SERVICE CARD

Microsoft Consumer Products announces **Editor/Assembler-Plus**, an editing, assembling and debugging package for the TRS-80. Major new Assembler features include the ability to assemble directly into memory, conditional assembly and macro facility. $29.95 on cassette. Microsoft Consumer Products, 10800 NE Eighth, Suite 819, Bellevue, WA 98004. (206) 454-1315.

CIRCLE 284 ON READER SERVICE CARD

AGENS, an **assembly generation system**, allows the user to assemble machine language programs for any of the popular 8 and 16-bit microcomputers. The system is available on 8-inch diskette for use on CP/M Z-80 computer systems. $170. RBB Software Products, P.O. Box 2111, Yorba Linda, CA 92686. (714) 637-5965.

INTRODUCING
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And when you need them: Memory Modules—plug-in modules for storing programs and data; an "extra smart" Card Reader; a Printer that prints upper and lower case alpha plus special characters and does high resolution plotting; the Wand to input programs in bar code form (available early 1980); Application Modules—preprogrammed, plug-in modules that give solutions to a wide range of problems.

The HP-41C lets you reassign any standard function, any programs you've written, or programs provided in the Application Modules—to any keyboard location you want. And of course Hewlett-Packard backs the HP-41C with total software support including an Owner's Manual and thousands of programs in the HP-41C Applications Pacs, Solutions Books, and the HP Users' Library.

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CIRCLE 126 ON READER SERVICE CARD

North Star Doc

DOCUMENTATION
- Prints formatted program listings (user selected spacing, titling, dating, and automatic paging)
- Prints cross reference table of all program variables
- Prints cross reference table of all 'GOTO' type statments

OPTIMIZATION
- Concatenates short lines into multiple statement lines of user selected length (Max=255 chars/line)

SPEED
- Faster execution of 'GOTO' type statements (up to 75% reduction in the number of lines of coding allows basic to locate the destination of a 'GOTO' type statement faster)
- Fast effecient subroutine to implement 'GOTO N' type statement

SIZE
- Typically reduces program size by 35%
- Removes all blanks not enclosed in quotes
- Optionally removes all REM statements except those that are the target of a 'GOTO' type statement
- Saves three bytes for every statement concatenated

CONFIDENTIALITY
- Optionally inhibits the correct functioning of the North Star Basic 'list' and 'edit' commands if the user specified line length exceeds 132 chars/line

DOC runs on release 4 or 5 of North Star Basic, single or double density drives. Minimum of 32K memory required. $50.00 price includes diskette and instructional manual. Order your copy from:

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9-digit alphanumeric key for fast key random access. Reports include order info, performance summary, etc. Calculate E.O.Q. Powerful report writer. MOD-II $149.

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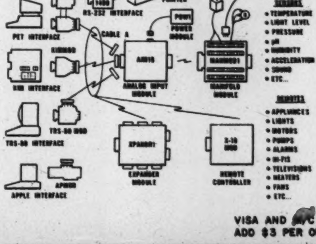
Each of the 16 analog inputs, in the range of 0 to 5.12 volts, is converted to a number between 0 and 255 (20 millivolts per count).

Software is included.



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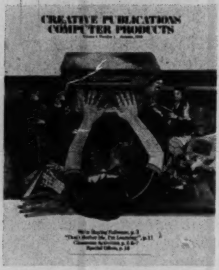
More than a Catalog

Creative Publications' new full-color catalog is more than a great catalog of computer products selected for education. It's a magazine featuring articles on educational computing and classroom activities. We made it a visually exciting introduction to the world of computers in learning. We're bringing it out twice a year to keep up with this changing field. And we'll send it to you if you drop us a line.



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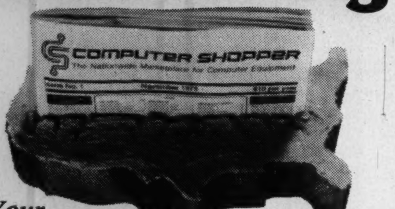

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CIRCLE 129 ON READER SERVICE CARD

Reviews

Stephen B. Gray

More Basic Computer Games, edited by David H. Ahl. Creative Computing Press, Morristown, NJ. 195 pages, paperback $7.50. 1979.

Fulfilling the promise made in the microcomputer edition of "Basic Computer Games," that a second volume was coming, this game book contains "84 Fabulous Games for Your Personal Computer," according to the cover, which adds, "All in Basic with program listing and sample run."

As the introduction puts it, there are games here that teach resource management (such as Camel), let your children perfect their matching and memory skills (Concentration), navigate in a three-dimensional universe (Maneuvers), start your whole life over again (Millionaire), or let your kids "argue with the computer — instead of you — if they want to stay out late on Saturday night" (Father).

If you read **Creative Computing** religiously, many of these games may look familiar, because 34 of them first appeared in the magazine. The 34 include Artillery 3, Bible Quiz, Blackbox, Bocce, Condot, Deepspace, Geowar, ICBM, Mastermind, Motorcycle Jump, Nomad, Roadrace, Rotate, Schmoo, Seawar, Twonky, UFO and Wumpus.

Even if you have all the back issues of **Creative**, the book still contains 51 programs you may not have seen before, including Baccarat, Big 6 (carnival betting wheel), Bombrun, Camel (hazardous trek across the desert), Chuck-A-Luck, Close Encounters (avoid the UFO or destroy it), Concentration, Convoy (naval war game), Corral (tame a wild horse), Eliza (the psychiatrist), Grand Prix, Joust (with a knight), Man-Eating Rabbit, Millionaire, Minotaur, Pinball, Shoot (last two survivors of total atomic war), Smash (one-lap jalopy race), Tennis and Warfish (submarine game).

Although nearly all the programs here are for interactive games, a few are not, such as Inkblot (randomly generated Rorschach designs), Lissajous, Pasart (patterns based on Pascal's triangle), Scales (generates 11 types of musical scales starting at a chosen note) and Ticker Tape.

The games are all in Microsoft Basic. Two pages on Basic are provided, along with details on how to convert the games to other Basics.

Some of the games in this second volume are available on tape cassette and floppy disk from **Creative**, either from your local computer store or directly from **Creative Computing**.

The many illustrations by George Beker, mostly of robots, are highly imaginative and fascinating in their own right.

The 84 games here will keep you busy and intrigued for many, many months, as well as develop your imagination, memory and reflexes.

What's missing from this volume is the "Contents by Game Category" that was in the first book, which listed the games under categories such as educational, matrix manipulation, logic, space, sports simulation, combat, etc. Regardless, this book is an absolute must for anybody who calls himself a computer gamesman. And at 9¢ a game, the price is right!

Z80 Assembly Language Programming, by Lance A. Leventhal. Osborne & Associates Inc., Berkeley, CA. 642 pages, paperback $9.50. 1979.

This is the fourth in Dr. Leventhal's series on microcomputer assembly languages, written in his usual detailed, expert style.

The book includes features such as over 80 programming examples, all problem solutions in source code and object code, comparisons of Z80 - 8080A/8085 instruction sets, full explanation of each Z80 instruction, how to program the Z80 interrupt system and Z80 input/output devices, and interfacing methods.

After a short introductory chapter, Leventhal jumps right into a chapter on assemblers that has a great deal of what, but very little why for the neophyte. A reader with experience in assemblers should have little or no trouble with this book, but a beginner will find it tough going unless he's quite bright, highly motivated and makes sure he understands every sentence before going on to the next.

Subsequent chapters are on the Z80 Assembly-Language Instruction Set, Simple Programs, Simple Program Loops, Character-Coded Data, Code Conversion, Arithmetic Problems, Tables and Lists, Subroutines, Input/Output, Interrupts, Problem Definition and Program Design, Debugging and Testing, Documentation and Redesign, and Sample Projects (digital stopwatch, digital thermometer).

There may never be a better book on the Z80 assembler than this one, but only a fantastically dedicated beginner, or a professional, will get beyond the middle of the third chapter. This book separates the men from the boys, the really serious programmers from the tinkerers.

* * *

A Beginner's Guide to Computers & Microprocessors — with projects, by Charles K. Adams. Tab books, Blue Ridge Summit, PA 17214. 303 pages, paperback $6.95. 1978.

Here's one more book explaining computers to beginners. One pleasant difference from many of the others is that Adams writes well, and makes many complex things quite understandable.

On the other hand, he doesn't write enough about many things. For example, a NAND gate is described in two short sentences, very clear but not enough to tell you what a NAND gate does. So the 1/3-page drawing, and the two sentences, like many others in this book, are wasted because they raise more questions than they answer.

Chapter 4, on Microprocessor Architecture, uses seven full pages on block diagrams of CPUs such as the 8080, 4040 and 8008, mainly filler material because these diagrams aren't discussed much in detail.

The book has two introductory chapters, four on hardware, two on software, one on systems and three on Building a Simple System. These last three comprise the "projects" in the book's title. Eighty pages are used to tell you how to build an 8080A-based system with 256 bytes of RAM, 512 of EPROM, a 16-button keyboard for data entry, a 10-button keyboard for program control, etc. Is anybody really interested in building such a system from a book? Especially one that has no photographs or diagrams showing you how to lay out the boards or the front panel, other than one drawing, of the "CPU parts layout."

The book does have some good portions, but is hampered by using only assembly language throughout (the words Basic and Fortran don't appear anywhere), being too skimpy in too many places, and spending 80 pages on a system that not one reader in a thousand will build.

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Problems For Computer Solution: Student Edition, by Stephen J. Rogowski. Creative Computing Press, Box 789-M, Morristown, NJ 07960. 109 pages, paperback $4.95. 1979.

If this title is familiar to you, maybe that's because at least three books have been published using it, the best known being the one written by Gruenberger and Jaffray some years ago. Also, you may have seen the Rogowski book in its previous incarnation, published by Educomp Corp. in 1975. Educomp changed its name to Quodata, started marketing computer systems to municipal governments instead of to schools, and got out of publishing.

The book gives 90 problems for you to solve with a computer, divided into eleven categories: arithmetic, algebra, geometry, trig, number theory, probability, statistics, calculus, science, general and "unsolved."

Some of the problems are simple, such as figuring out the interest on the $24 the Indians are said to have sold Manhattan to the Dutch for. Or generating your own log tables. Some are not so easy, such as converting rational numbers to continued fractions, or finding self-generating integers. A couple have never been solved.

This is a fine book, with clear and concise writing, if you like the challenge of solving problems with computer programs. Even if some of the problems may not turn you on, the variety provided here should give you enough others to keep you busy for months, if not years. References are provided if you need to learn more about the problems.

A Teacher's Edition is also available, at $9.95, with problem solutions, a program that produces each solution, an analysis of each program and, occasionally, suggestions for further reading or research.

Best of Interface Age: Volume 1: Software in Basic, edited by Carl D. Warren. Dilithium Press, Portland, OR. 314 pages, paperback $12.95. 1979.

The title is misleading. Although this book is about four well-known Basic interpreters, they are all in assembly language. So this book is for hard-core assembler fans, or for anybody intending to really dig into what makes Basic tick, rather than for somebody looking for a collection of programs written in Basic.

The entire book is taken up with the four interpreters: Lawrence Livermore 8080 Basic; Li-Chen Wang's Palo Alto TINY Basic; National's TINY Basic-NIBL; and "The Great Experiment — Floppy ROM #1," Robert Uiterwyk's 6800 4K Basic.

The two appendices may well be unique in books on personal computing: the first is a "comprehensive index of general-purpose software printed in Interface Age since January 1977," and the second is a "list of all the back issues that are still available, and how to obtain them." Tch-tch.

The preface, by Carl Warren, who was editor-in-chief of Interface Age at the time of publication, and who, at this writing, is the West Coast editor for EDN magazine, notes that more volumes of the "Best of Interface Age" are forthcoming, one on general-purpose software, two for the "small businessman" (5'5" and under?), and one that "contains those articles for the futuristic thinker and gadgeteer."

The preface also says that the four reprinted articles in this book "provide the reader with some of the most useful software ever created." Useful now for study, and for that purpose highly welcome by the small fraternity of assemblerniks. But surely not intended for direct use on your computer or mine . . .

Introduction to T-BUG, by Don Inman and Kurt Inman. Dilithium Press, Portland, OR 97210. 125 pages, paperback $6.95. 1979.

The back cover says this is "the only book to describe in detail the machine-language monitor operations of the popular Radio Shack TRS-80 computer." It also says that "Kurt Inman is Don's 15-year-old son and an author in his own right."

As with every other publication involving machine-language monitors, this one doesn't say a word about why a TRS-80 owner should be interested in T-BUG. The authors apparently assume that if you buy the book, you're interested.

The book is based on seven "problems," meaning the authors tell you how, in detail, to perform seven specific tasks with T-BUG. These tasks are: display keyboard input, display data from memory, save and run programs on cassette, write a number-guessing game, create graphics with the 63 graphics characters, use graphics to enhance a computer game (Nim) and debug with T-BUG.

This is obviously only for the really serious programmer with an interest in learning more about T-BUG than available in the Radio Shack publications.

The major value of this book is that it shows, in great detail, how to do something, rather than just tell what T-BUG consists of and how to use it. If you go through this book conscientiously, using it with your TRS-80 rather than just reading it, you'll probably learn all you want to know about T-BUG.

* * *

Problems For Computer Solution, by Donald D. Spencer. Hayden Book Company, Inc., Rochelle Park, NJ. 122 pages, paperback $5.95. Second edition, 1979.

This is Hayden's edition of the same book originally published in 1977 by the author's own Camelot Publishing Company.

According to the back cover, this book is "intended for teachers and students who want more diverse problems than those offered in programming-language textbooks."

Just like the Rogowski book of the same title, also reviewed in this issue, Spencer's book presents problems in eleven categories: introductory problems (75 of them); algebra (127); geometry (104); trigonometry (34); probability and statistics (90); intermediate mathematics (118); number theory (86); science, chemistry and physics (38); business (64); fun and games with the computer (45); and "a smorgasbord of problems" (40).

That's a total of 821 problems, which works out to about seven-tenths of a penny per problem, compared with 5.5 cents a problem in Rogowski's book.

The big difference is that each problem is given a full page in the Rogowski book, whereas Spencer provides up to 10 or 12 problems per page. Most of Spencer's problems are quite short, such as "Find the greatest common factor of a given set of three numbers," or "Convert Roman numerals to Arabic" or "Write a program that generates random four-word sentences." Several are a third to half a page long, because they include details on such complex things as a "wheel of fortune" game, or the "sailors and coconuts" puzzle, or the drunk's random-walk problem. Within each chapter, the problems are said to be arranged in order of difficulty.

All in all, this is quite a bargain for the problem-hungry, with a large number of problems that should keep you in close contact with your computer for a very long time. Even if you work on only one out of every ten problems, you'll learn a great deal about computers and problem-solving if you can work them all out, or at least make a good try.

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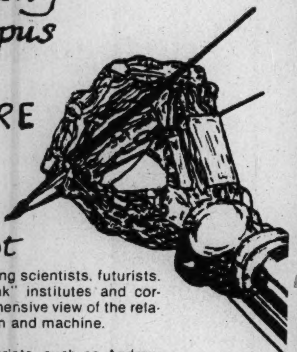

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Introduction to Low-Resolution Graphics, by Nat Wadsworth. Scelbi Publications, 20 Hurlbut St., Elmwood, CT 06110. 80 pages, paperback $9.95. 1979.

Subtitled "How to draw lines, create shapes, animate figures, prepare charts for business or pleasure," this paperback combines some introductory material on graphics with advanced programs that are presented without derivation or much of an exploration.

The first 28 pages are good, with chapters on Getting Started (the display grid; turning points on with the Apple II, PET and TRS-80), Math (determining offsets in the three systems), Drawing Simple Shapes (triangles) and Drawing Lines (and circles).

Chapter 5, A Graphics Library, includes over seven pages of Apple II subroutines that draw pictures of playing cards, for a card game. This is too much for a beginner's book, which should be much simpler, unless the reader is content with simply using subroutines right out of the book.

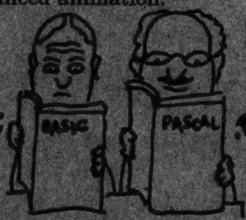
The same chapter presents a four-page Apple II program that draws a clown figure, with a mouth that opens and closes, an eye that winks, a hand that points right or left. Clever, but very little is given to help you understand how this program works. Also clever: how to add sound to the clown display.

The last 17 pages of the book are devoted to an animated game of football, with a listing for the Apple II (the author offers a coupon good for a free listing of the football game for the TRS-80 Level II or Commodore PET).

The programs for playing cards, clown and football are indeed interesting, but the book would be of much greater value if it stuck to the simpler side of graphics, and showed in detail, for instance, how to animate just one football player, instead of a whole team.

This is a book to buy once you've done some work in graphics, and are interested in advanced techniques. At this writing, this is only the second book available on personal computer graphics (see the review of Don Inman's "Introduction to TRS-80 Graphics" in the July 1979 **Creative**, p 159).

Several more books on graphics are on the way; let's hope they cover much more of the elements of graphics, instead of stopping at simple sinewaves, or getting too fast into advanced animation.



The Code Book, by Michael E. Marotta. Loompanics Unlimited, P.O. Box 264, Mason, MI 48854. 76 pages, paperback, $6.95. 1979.

This book is subtitled, "All About Unbreakable Codes and How to Use Them." It is described by the publisher as presenting "obscure secrets known only to international espionage agents and professional cryptographers — now revealed for you to use." Well, maybe.

The book is short (43 pages of text) and set in large type so it's the equivalent length of a long magazine article. Reading time is about a half hour. Appendix II includes 10 pages of random numbers, while Appendix I contains four short computer programs to add plaintext messages (A=1, B=2, etc.) to 5-digit random numbers. If you've read **The Ultra Secret** and any of Dover's cryptography books, you won't find anything new in this one. On the other hand, if you'd like a short summary of codes and cyphers with a dash of practical advice ("Remember that coding, program writing, verifying and obfuscating take up your own time") then you may find this book worthwhile. I didn't. —DHA

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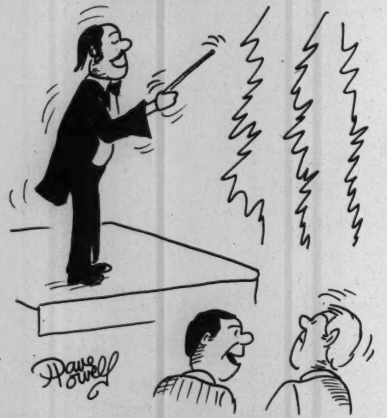
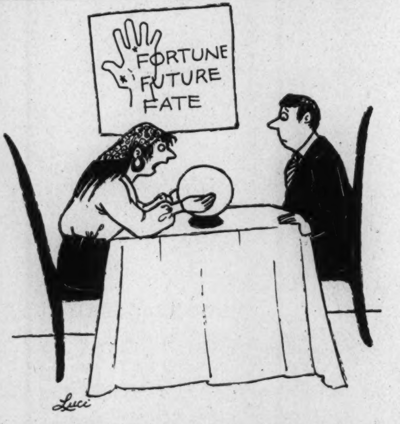
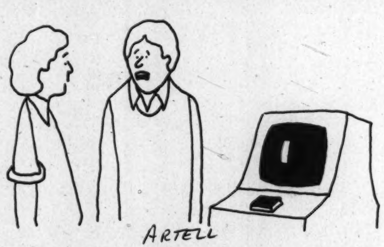


"He's one of the greatest conductors of electricity!"



By nightfall, your entire program will be a total disaster.



We may have taken this keyboard simplification thing one step too far.

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The Computer Store—63 S. Main St, Windsor Locks 06096; (203) 627-0188. 10-6 MTWF, 10-8 Thu, 10-4 Sat.

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Computer Mart—560 West 14 Mile, Clawson 48017; (313)288-0040. The Midwest's largest computer store! (We will not be undersold!!)

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The Computer Corner Inc—200 Hamilton Ave, White Plains 10601; (914)WHY DATA. 10-6 Mon-Sat, 10-9 Thu.

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The Basic Computer Shop—2671 W. Market St, Akron 44313; (216) 867-0808. 10-6 Mon-Sat.

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Dr. kiloBYTE's creative Popular Personal Recreational MICROCOMPUTER DATA INTERFACE WORLD Journal

April Fools 1980
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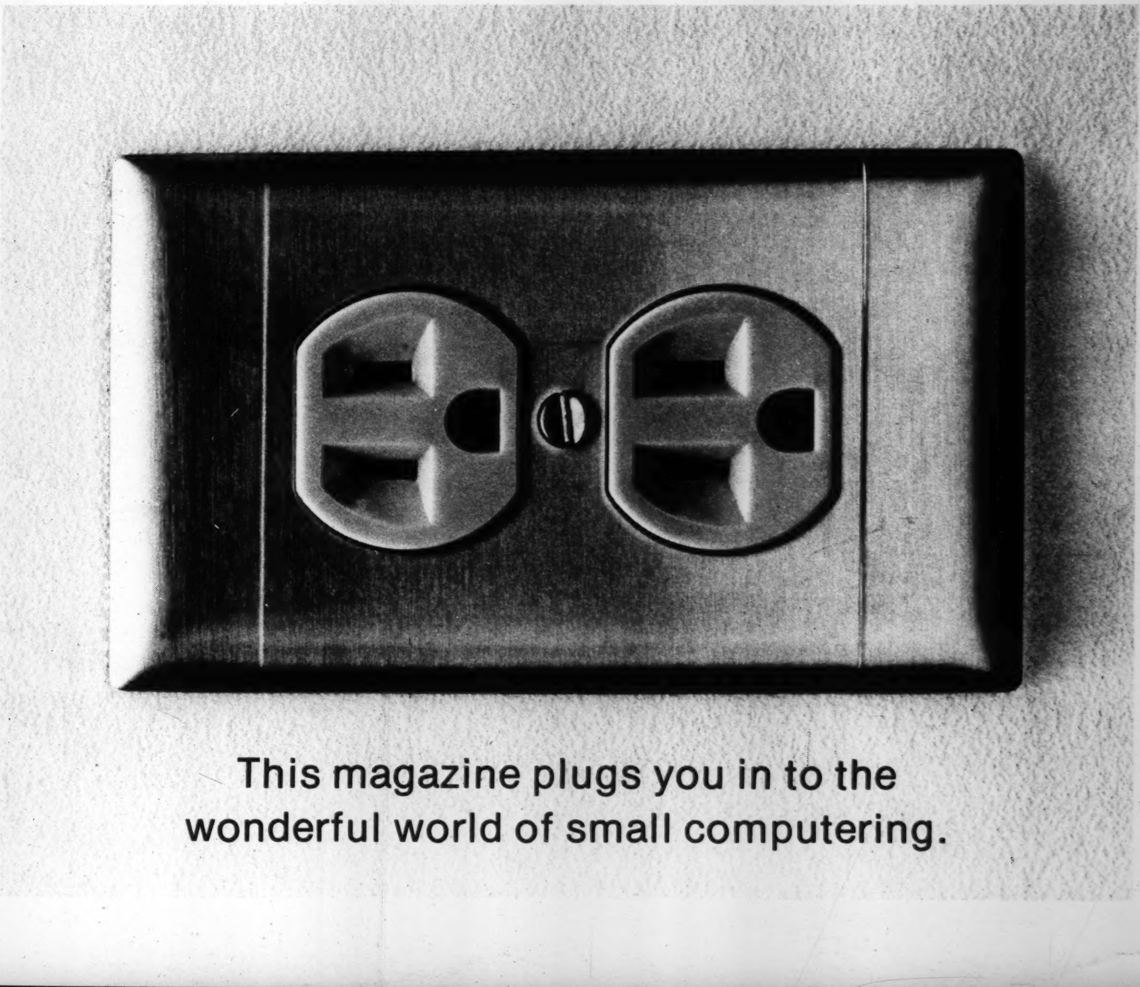

This magazine plugs you in to the wonderful world of small computering.

The home computer you thought was years away is here.

CHALLENGER 8P
FLOPPY DISKETTE
OHIO SCIENTIFIC

C8P DF $2,597

Ohio Scientific's top of the line personal computer, the C8P DF. This system incorporates the most advanced technology now available in standard configurations and add-on options. The C8P DF has full capabilities as a personal computer, a small business computer, a home monitoring security system and an advanced process controller.

Personal Computer Features

The C8P DF features ultra-fast program execution. The standard model is twice as fast as other personal computers such as the Apple II and PET. The computer system is available with a GT option which nearly doubles the speed again, making it comparable to high end mini-computer systems. High speed execution makes elaborate video animation possible as well as other I/O functions which until now, have not been possible. The C8P DF features Ohio Scientific's 32 x 64 character display with graphics and gaming elements for an effective resolution of 256 x 512 points and up to 16 colors. Other features for personal use include a programmable tone generator from 200 to 20KHz and an 8 bit companding digital to analog converter for music and voice output, 2-8 axis joystick interfaces, and 2-10 key pad interfaces. Hundreds of personal applications, games and educational software packages are currently available for use with the C8P DF.

Business Applications

The C8P DF utilizes full size 8″ floppy disks and is compatible with Ohio Scientific's advanced small business operating system, OS-65U and two types of information management systems, OS-MDMS and OS-DMS. The computer system comes standard with a high-speed printer interface and a modem interface. It features a full 53-key ASCII keyboard as well as 2048 character display with upper and lower case for business and word processing applications.

Home Control

The C8P DF has the most advanced home monitoring and control capabilities ever offered in a computer system. It incorporates a real time clock and a unique FOREGROUND/BACKGROUND operating system which allows the computer to function with normal BASIC programs at the same time it is monitoring external devices. The C8P DF comes standard with an AC remote control interface which allows it to control a wide range of AC appliances and lights remotely without wiring and an interface for home security systems which monitors fire, intrusion, car theft, water levels and freezer temperature, all without messy wiring. In addition, the C8P DF can accept Ohio Scientific's Votrax voice I/O board and/or Ohio Scientific's new universal telephone interface (UTI). The telephone interface connects the computer to any touch-tone or rotary dial telephone line. The computer system is able to answer calls, initiate calls and communicate via touch-tone signals, voice output or 300 baud modem signals. It can accept and decode touch-tone signals, 300 baud modem signals and record incoming voice messages. These features collectively give the C8P DF capabilities to monitor and control home functions with almost human-like capabilities.

Process Controller

The C8P DF incorporates a real time clock, FOREGROUND/BACKGROUND operation and 16 parallel I/O lines. Additionally a universal accessory BUS connector is accessible at the back of the computer to plug in additional 48 lines of parallel I/O and/or a complete analog signal I/O board with A/D and D/A and multiplexers.

Clearly, the C8P DF beats all existing small computers in conventional specifications plus it has capabilities far beyond any other computer system on the market today.

C8P DF is an 8-slot mainframe class computer with 32K static RAM, dual 8″ floppies, and several open slots for expansion.

C8P $895

Or get started with a C8P with cassette interface, 8K BASIC-in-ROM which includes most of the features of the C8P DF except the real time clock, 16 parallel I/O lines, home security interface and accessory BUS. It comes with 8K static RAM and Ohio Scientific's ultra-fast 8K BASIC-in-ROM. It can be expanded to a C8P DF later. Base price $895. Virtually all the programs available on disk are also available for the C8P cassette system on audio cassette.

Computers come with keyboards and floppies where specified. Other equipment shown is optional.

For literature and the name of your local dealer, CALL 1-800-321-6850 TOLL FREE.

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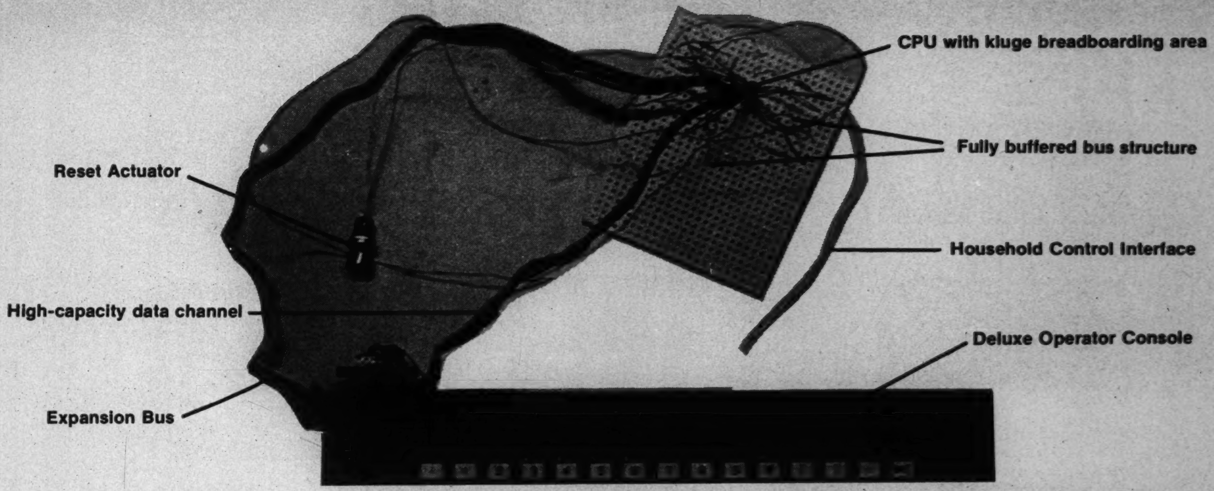
CIRCLE 172 ON READER SERVICE CARD


CPU with kluge breadboarding area
Fully buffered bus structure
Reset Actuator
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High-capacity data channel
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The single chip computer with the features that help you escape from life

INCOMPLETE COMPUTER

In this advanced chip you get an amateur quality computer that meets few if any of the needs of the serious user. It's totally incomplete. You'll spend literally months getting it to accept a single data bit. All you need to make it run is unlimited time and money.

The computer itself (the thing with the holes) is super. Fast 4 gigahertz operation is so fast that its speed can't be detected with normal test instruments, nor is it compatible with any standard low-speed peripherals available from any other manufacturer, even Cray or CDC. The 690 holes provide cooling from the astronomical temperatures that are generated when electrons are moving at the rated 4 gigahertz speed. And when equipped with the Formula Vee turbocharger option, it makes other computers like Cray-1's and TRS-80's seem like baby toys. Sheer speed is what separates computers from toys, a good lesson to remember the next time you buy a car.

Other features include a 3-bit high capacity bi-directional data channel between the CPU and operator's console, an 8-inch household control interface and fully-buffered on-board bus.

Add that to vectored inputs.

IMPOSSIBLE EXPANDABILITY

Besides all these features the Cromagnon single chip computer gives you impossible expandability if you ever need it. We've made it impossible because we can't imagine that you'll ever need more capability than what's already built in. That includes a deluxe operator console with no raised surfaces. It's even dishwasher safe. A reset actuator stops the operation of the computer, even mid cycle, and resets everything to a random value.

However, if you can find mil spec high heat components (over production from the Mercury and Sun space shots perhaps) you can wire them onto the breadboarding area adjacent to the CPU. You'll want these components close to the CPU to minimize electron travel but not too close lest they disintegrate from the extraordinarily high temperature of the CPU.

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HARD TO USE

Another inconvenience that makes the Model XPM (for 'experimental') computer so difficult to use is our 4K PL/I compiler. This features a subset of ANSI subset PL/I including the powerful 'BEGIN' and 'END' statements. With this included software you're ready to go. In addition the monitor gives you one more command (NOP). This software, without extensive modification will not access any I/O ports, the operator's console, or the memory.

Finally, to simplify things to the ultimate, there is no memory, nor is there any way of adding any. In addition, there is no way to power up the unit, so you'll never have to worry about heat, fires, lost data, frustration and all the other things that go hand-in-hand with computers of any size or shape.

OPTIONAL CAGES

If you feel that watching a computer do nothing is not your cup of tea, we suggest a cat. Cats are fun, they keep your feet warm on cold winter nights and they have kittens. Our optional animal cage will help you capture stray cats to bring home.

So act today. Get this unbelievable computer and a cat in your home right away.

Software for the PET

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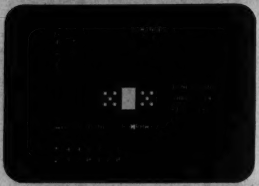

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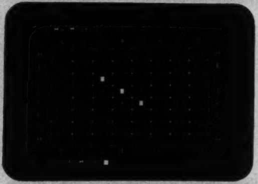

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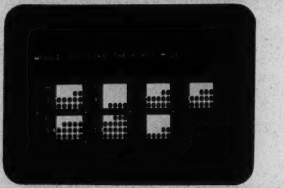

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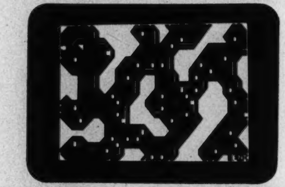

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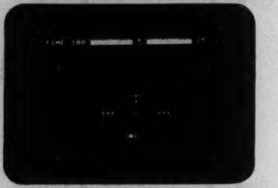

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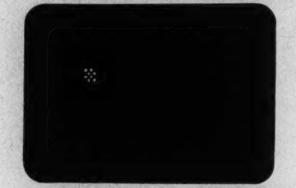

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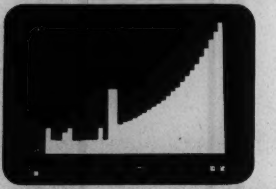

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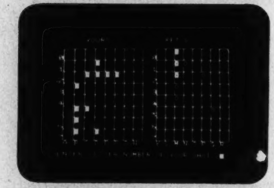

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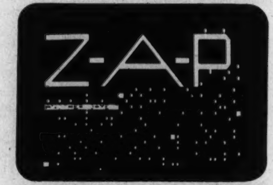

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Dr. KiloByte's Creative Personal Recreational MicroComputer Data Interface World Journal is published when the mood is upon us, generally in conjunction with April Fool's Day. It is published by the self-same erudite, highly educated gang of idiots that bring you the sensationally sparkling, unbelievably wonderful Creative Computing magazine every month. Offices in Post Office Box 789-M (a cozy place), Morristown, NJ 07960.

Any resemblance to people, magazines, styles, etc. in this magazine is intentional for satirical and humorous purposes only. Letters about suing us will be ignored.

Single copies of this issue $2.50 (except to libel lawyers, to whom copies are not available at any price).

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PUBLISHER'S REMARKS

Wine Yellow

Other Magazines Awful

Recently I had a chance to read all the other personal computing magazines... It will come as no suprise to readers of DKBCPPRMCDIWJ that, objectively speaking, there's no other personal computing magazine worth reading. For example, I notice that *Byte* is written only for Ph. Ds. I can't imagine an ordinary person like myself understanding all that hard stuff! Besides, according to a recent survey 89% of Byte's readers have a Bachelor's degree or better... I just can't understand why advertisers want to waste all their good money on such rich educated snobs! The average DKBCPPRMCDIWJ reader has a 9th grade education and probably buys a whole lot more computer stuff in a year than one of those high class *Byte* readers. To give you a short course in advertising, you can *always* tell the best place to advertise by where the mail order ads are. Ignore all those fancy dancy statistics like cost per thousand and all that stuff; it's just a big snow job. I'm even trying to convince some advertisers to run mail order ads for cake mixes and dog food. Watch these pages.

Next we come to *Interface Age*. As I'm sure you're all aware, Interface Disgrace is strictly for OEMs... an abbreviation I picked up somewhere for "Optional Equipment Manufacturers." This is a technical term, you don't have to remember it. Just remember, *Interface Age* is strictly for small business applications. Admittedly, I'll admit this is a much larger and more lucrative field than hobby computing, but, heck... I'm not in this for the money! So don't buy *Interface Age* or advertise there. I'm just trying to help you.

Everytime I read *Creative Computing*, it reminds me that I don't like science fiction. And the worst thing about *Creative Computing* is that all their readers are high school students! All of them! If you look at the statistics I know they'll seem different but that just goes to show you what a snow job numbers can be. I never trust them myself. Besides, I can never get those programs in that magazine to work on my 4K Level I TRS-80. I think they put errors in those programs on purpose...

Basic Dooms Other Computer Languages

Nowadays, BASIC is so popular that it threatens to make every other computer language obsolete... or irrelevant! I can hear the screams and the gnashing of teeth in the entire DP industry already... but they'll just have to wake up to the fact that it's the micro end of computing that's in the forefront. They'll have to convert all those old FORTRAN, COBOL, APL, LISP, PL/I, PASCAL, assembler, and everything else programs to good old Microsoft BASIC. This is really a fantastic opportunity for some hobbyists who know what they're doing.

A few of the whining liberal progressives in the field may claim that BASIC is about 15 years old and that it is practically ancient but to those people I say So What. Progress is never easy. In fact, one day BASIC may even make English obsolete. So, my message to all these backward people trying to stifle my creativity by denying that BASIC is the only good computer languages is: 850 IF K=U(I) THEN GOSUB 4020 ELSE K=FND(Q(I,J))*SIN (X)!

IBM Personal Computer

I predict that IBM will be very disappointed in sales of its new liquid helium cooled "P-Series" personal computers (see the new product announcement elsewhere in this magazine)... I've always maintained that an 8-bit micro (such as my own 4K Level I TRS-80) is more than capable of handling anything I've ever thought of. All that extra stuff, like femtosecond cycle times, megabytes of memory, and new-fangled computer languages, are just cheap gimmicks. I ask, can it run Level II BASIC business software? But IBM sales people just give me blank stares...who knows, they could be computers themselves.

Make Millions with Instant Confusion Software

Almost everyone has a few game programs lying around that could easily be parlayed into an immense fortune. Let's say, for instance, that you typed in the TicTacToe game from that BASIC Computer Games book... Now, if Instant Confusion Software was able to sell that program in 20,000 Radio Shack stores and in 2,000 retail computer stores, and sold just a paltry 500 in each store, that would be 11,000,000 cassettes sold! At $20 each and a 20% royalty you could be $44,000,000 richer... not bad for just TicTacToe.

Naturally, if you sell the program to one of our many inferior competitors, they will probably only sell a few hundred thousand at the most. You'll just be hurting yourself. So send in those programs! If I could get that TicTacToe game to work, don't think I'd hesitate for a second...

Help Protect Instant Confusion Software

At Instant Confusion Software, we are very aware of the piracy of personal computer software that goes on... both at the retail and the individual level. We have an idea to stop it. Go out and buy a handgun. Next time you're at a computer club meeting or at a computer store, be sure to admire an Instant Confusion Software program, and pressure the owner for a free copy. If he gives you one (always wait until he gives it to you)... pull out the gun and shoot him on the spot... this is a sure fire way of cutting down on software piracy and it is the thing that made America great.

I know, at first this is going to be hard for some of you to do. No one likes to shoot people. But next time a "friend" asks you for a copy of that Instant Confusion Software program, you have to make a very important decision. Is he really my friend or am I making a bigger mistake than I think?

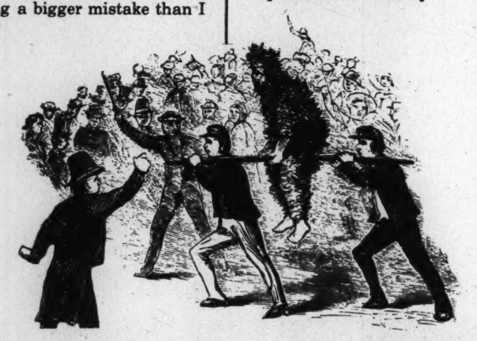
Microcomputer Organization for Trade and Retailers

The newly formed Microcomputer Organization for Trade and Retailers (MORTAR) may be firing some direct hits at some of our big problem areas. One thing that really concerns me is the Yellow Peril of foreign-made microcomputers. My suggestion is that we fight OPEC by jacking up the prices of microcomputers sold overseas higher and higher and higher. Then we take the excess profits and make computers over here dirt cheap. Not only do we save America and keep it great but we also take care of those Japs and Chinks and other undesirables.

Reader Liability

One of your weighty and inescapable responsiblities as a reader of DKBCPPRMCDIWJ is to aid and abet our ambitious drive to get more advertisers and readers. This will benefit you by making this a bigger and better magazine thus increasing our circulation and advertising even more! You can help by "encouraging" your friends to subscribe when they've had too much to drink at parties or even take names out of the phone book and fill in a few subscription blanks. They won't be sorry later. You can help even more by tearing out the reader service card in the back of the magazine and sending it in. Advertisers put a lot of stock in these reader responses to their ads so do it now! (All the numbers have been pre-circled for your convenience.) Failure to take your reader liability seriously may result in legal action and possible unfortunate unintentional harm to your close relatives.

Pictured below is what happens to readers who do not take their responsibilities seriously.



Mainframe Owners . . . Maybe TIS-80 Should be Your Next Hardware Investment!

Designed for business. Television Igloo's design concept for the TIS-80 was to build a computer that could be used in the home — not a "home computer." There's a big difference. The TIS-80 is perfect for those jobs that interrupt the data processing schedule of large business computers, like keeping track of office betting pools, gossip update reports, and expense account padding calculations. Compare this machine with the highly overrated IBM 5110 and you'll see why we have the competition quaking in its boots.

Software for the TIS-80 includes accounts payable, accounts receivable, general ledger, stock market analysis, inventory, payroll, corporate financial planning, mailing lists, statistics, advanced multi-user database mana-ger, online insurance records system, and Chase-Manhattan Banking System. (All available third quarter 1980. We Promise.)

Want to change our software to fit your way of doing things? Forget it! It would take an expert programmer 200 hours at $50/hr. to do it. It's cheaper just to change your system to fit ours. That's what computers and technology are all about.

Expansion beyond the basic unit requires the expansion interface, buffered expansion cable, buffered expansion cable buffered interface, buffered expansion cable buffered interface cable, and two nine-volt batteries (not incl.)

The new TIS-80 Model II (see inset) is an entirely new concept in computing. It features an advanced hexadecimal keyboard, augmented keyboard, and sophisticated graphics for tic-tac-toe and biorhythms. It's all business.

TIS-80 Features

- 23K or 39K RAM
- External printer
- 17 connecting cables
- 13X22 character CRT
- 5 Paddle controllers
- Separate keyboard
- Vectored 4H2 throughput

The new
TIS-80 Model II

Television Igloo

The biggest little name in little big computers™

By Htron Evets,
Features Editor

You Can Tune Up Your PDP-11

Even real computers can benefit from a tuneup and bolt-on mail-order accessories. Here's how to do it.

When we first got our own 128K PDP-11/34 with twin 80 megabyte CDC hard disks and three Hazeltine 1500 terminals, we thought we had something really special on our hands. "Humph!" we exclaimed. "Microcomputers are just toys! That's why we can't get more than two of our thirty systems to work at the same time. But this is a real computer. It cost $76,000, more than any of us make even in a whole year! It won't let us down." Once that illusion was surgically removed courtesy of Control Data Corporation, we were able to view the 11 as just so many Poly-Paks bargain barrel drop-out ICs though it can support a mean game of multiplayer Star Trek written in virtual LISP.

This brings us to the crisis at hand. We noticed that when all three players were trying to dock their ships at Starbase while the LISP interpreter was doing a virtual memory garbage collect, there was a perceptible time delay of 0.2 seconds (worst case). This was extremely disturbing (as you can well imagine) and required immediate action if not sooner.

Photo 1: Flushing out clogged circuits.

The first step was to correct a warped memory circuit board. This is best done with a large crowbar. The standard procedure is: Carefully place the crowbar under the printed circuit card and apply pressure. Do not be afraid to use force if need be. Once the circuit board has been straightened out the electrons may flow in straight lines which are much shorter than the curved variety. In fact it is well known the light travels faster in straight lines than in curved ones too.

This did not help the problem much so the next step was to flush out the clogged circuits in the CPU. (See photograph 1. Abbrev.: Photo.) As computer circuits operate, excess electrons sometimes accumulate in out-of-the-way places especially inside integrated circuits. These bad electrons can actually slow down your circuits and make them weak and unreliable. The best thing to do is to get an electron extractor (Radio Shack part number 234-23652, it will be out of stock by the time you get to the store) and plunge them loose. Intensive research is being done at the University of Michigan (Flint) to figure out why and where the electrons get jammed up. One theory holds that it is somehow related to infrequently executed instructions which cause the flow of electrons to stagnate.

Unfortunately, this technique did not help the problem appreciably and it finally struck home that the factory stock PDP-11/34 simply does not have the muscle to run our sophisticated multiplayer Star Trek written in virtual LISP. Something more was needed.

We had read in some of the less respectable computer magazines that you can add a bolt-on turbocharger to your computer and expect an increase of up to 100 b.p.s. Financial reserves being somewhat depleted by a recent embezzlement scandal, we were able to borrow the cash from a fellow employee who explained that she had recently won the Irish Sweepstakes. It's good to know that there's at least *someone* you can trust and depend on when you want a PDP-11/34 Turbocharger add-on very *very* badly. So we sent away for the unit (made by a reputable firm called Earth Power Systems, they advertise heavily so you know they're for real) and waited, meanwhile cursing at the com-

Photo 2: Installing the Turbocharger.

puter every time all three players tried to dock their Starships while the virtual LISP interpreter was doing a garbage collect. (Did I forget to mention that the game is really written in TRAC Language which itself is simulated in LISP? Minor details.)

We were very pleased with the Turbocharger when it arrived, complete with a page and a half of documentation explaining all its wondrous virtues and where to plug it in. It was installed in short order by one of our maintenance workers, see photograph 2 (Abbrev.:Photo.). The installation took only an hour or so and a liberal application of Liquid Wrench helped speed the process. Unfortunately the rep (abbreviation for: representative) from our service agency showed up during the proceedings and did not take kindly to our little experiments. (It is well known that DEC has not officially been racing for years.) However, knowing beforehand that he would show up since this was the only time since the system was delivered that we did not want him around, we were prepared for his visit and diverted his attention with a PET which had a defective cassette interface. This gave us a chance to complete our installation. Later the service rep said that the PET was totally unable to read any cassettes and that this was an intentional design feature.

Once the installation was complete, we turned the 11 over to our resident bit-hacker who took it out for a spin and pronounced the result safe enough for regular use (see photo 3). Indeed, one experiences a real rush when sitting at the console of this high-powered system. The highly disconcerting problem with the Star Trek game has altogether vanished, we are pleased to report. Our next project will be to implement a PL/I compiler written in FORTRAN simulated in TRAC and of course all this done in LISP, and then to write an editorial dissertation on how we use all this computer power to do absolute cursor addressing on the Hazeltine terminal. Fascinating.

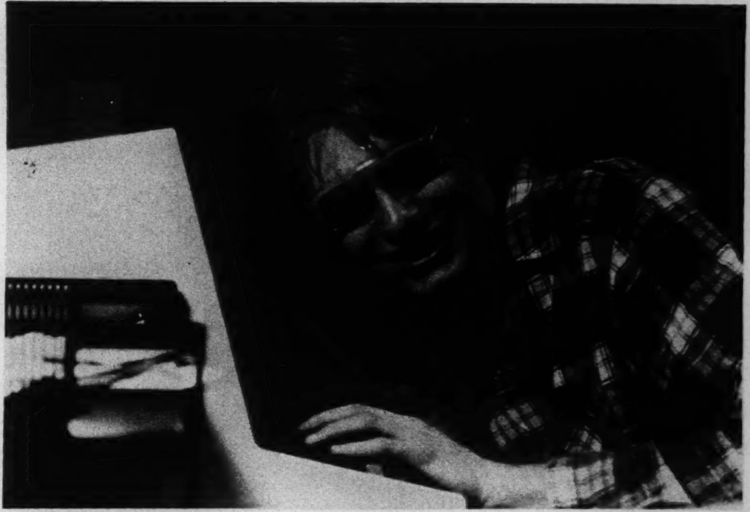


Photo 3: Taking the PDP-11 out for a spin. Go wild, son!

FOR TRS-80

WHAT CAN BE CRAZIER
THAN SELLING PASCAL COMPILER
FOR $15 and $23?

'Tiny' Pascal, runs on any 16K Level II system, includes the programming structuring capabilities of full Pascal, but not data structuring.

Compiled People's Pascal programs run about five-times faster than Level II Basic—graphics run eight-times faster. Tape 3 compiler written in Basic, requires T-Bug and Edit-Assmblr, compiles Z-80 code. Tape 6 runs in machine language, compiles faster, interprets P-codes.

People's Pascal tape 3, compiles machine code	$15.00
People's Pascal tape 6,	$23.00
Tape 1 Lev. II, 34 business, educational programs (lev. I version avail., 24 programs—separate tape)	$7.50
Tape 2 Lev. II, 77 programs from Osborne book, "Some Common Basic Programs	$7.50
Tape 4 Lev. I, 21 misc business and educational	$7.50
Tape 5 Lev. II, 24 business, educational programs	$7.50
Tape 7 Lev. II, 31 misc. business and educational	$7.50

Add $.50 each tape for postage and handling.
California residents add 6 pct. tax. Dealer inquiries invited.

COMPUTER INFORMATION EXCHANGE
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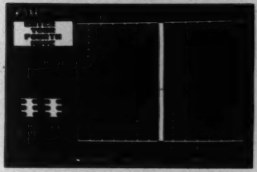
CIRCLE 128 ON READER SERVICE CARD

SOFTWARE
FOR THE ATARI® 400 800

All programs on cassette. Only 8K RAM required.

FASTGAMMON™ by Bob Christiansen. The most popular backgammon-playing game for personal computers is now available for the Atari. Written in machine language, but loads with a simple CLOAD and RUN. This is the best-playing version so far. Eight-page instruction manual includes the rules of backgammon. **$19.95**



ASSEMBLER by Gary J. Shannon. Create your own 6502 machine language programs with this easy-to-use editor assembler for the ATARI400 and 800. Includes several useful pseudo-ops. Interfaces with a printer. The editor allows for easy insert/delete, plus the capability to view and modify memory. **$24.95**

6502 DISASSEMBLER by Bob Pierce. This neat 8K BASIC program allows you to disassemble machine code and print out the disassembled listings. If you have more than 8K of memory, programs in RAM can be disassembled. ROM can be disassembled on any size Atari. **$11.95**

Available soon: **PROGRAMMER'S HANDBOOK FOR THE ATARI 400/800.** Written by Quality Software, this book is a goldmine of clever tricks and hidden facts concerning the software built into the Atari personal computer. **$14.95**

QS QUALITY SOFTWARE
6660 Reseda Blvd., Suite 103, Reseda, CA. 91335
Telephone 24 hours, seven days a week: (213) 344-6599

WHERE TO GET IT: Ask your nearest Atari dealer to see *Quality Software's* Atari programs. Or, if you prefer, you may order directly from us. MasterCharge and Visa cardholders may telephone their orders and we will deduct $1 from orders over $19 to compensate for phone charges. Or mail your order to the address above. California residents add 6% sales tax. *Shipping Charges:* Within North America orders must include $1.50 for first class shipping and handling. Outside North America the charge for airmail shipping and handling is $5.00 — payable in U.S. currency.

ATARI, ATARI400, and ATARI800 have been trademarked by Atari Personal Computer Systems, a Warner Communications Company.

CIRCLE 183 ON READER SERVICE CARD

Stephen Kimmel

The Etiquette Computers

Now you can go to even the swankiest affairs at the U.N. and not make an embarrasing faux pas.

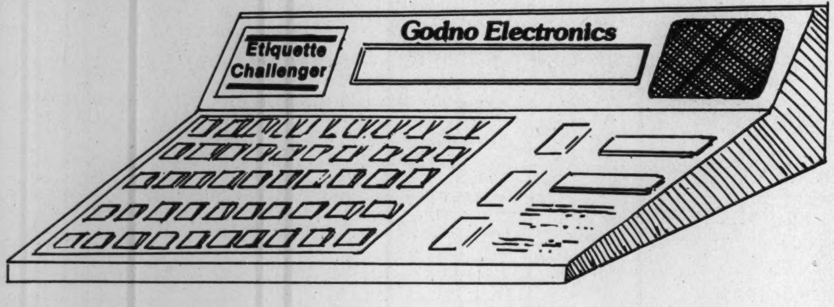
Once small hand held computers such as the Speak and Spell and the language translators had been taught to speak it was probably inevitable that it would occur to someone to teach one to actually improve on what the user was trying to say. Even if the language translators do speak rather broken Spanish, it shouldn't be too difficult to translate typical American English into the socially correct King's English. Yet that is exactly what the good folks at Godno Electronics have done. Not just once but twice with their two new products: The Etiquette Challenger and the Protocol Computer.

The two computers are essentially identical varying mainly in the programming in Rom and price, the Etiquette Challenger being an exorbitant $199.95 while the Protocol Computer is a ridiculous $299.95. They are both approximately the size of an unabridged dictionary and contain fifty proximity switches, a large speaker capable of 124dB and the twenty letter LED display unit. Both units require 14 "D" sized batteries which give the computers a weight of about 28 pounds. We were particularly impressed with the Etiquette Challenger's chartreuse plastic box, although the Protocol computer's hotline red is also impressive.

The instruction manual is a little on the skimpy side. It consists of a single sheet of paper taped to the bottom of the computer. Most of what it says is that you should read a good book on etiquette, that the company is not responsible for anything and that you should forget it anyway.

Operation of the Etiquette Computer could hardly be easier. You simply type in your statement which is recorded inside the machine. Push the translate button and the computer begins to analyze your statement. Anywhere from two seconds to ten minutes later the socially correct thing to say comes booming over the speaker.

I suppose it would be appropriate to say something about the quality of speech from the computer.



Just to test the unit completely we took it to a cocktail party with some friends near the office. We tried several examples on both machines. Everyone seemed to enjoy them immensely although none of them are currently speaking to us.

Example: We type in "Is that your nose or is that a banana?" Six minutes later the computer says, "My what a lovely necklace. Where is the taxi?" We tried the Protocol Computer with "Tell the Ambassador that we've declared war on his country." Two minutes later the Protocol computer said "Donde es su Taxi?"

Although the Etiquette Computer short circuited and reduced itself to a pool of green plastic when we spilled the Ripple on it, our Protocol Computer proved to be a reliable unit for three hours.

At $199.95 and $299.95, these units are a must for everyone who has no friends and couldn't care less. The units even have braille letters on the keys for use by the blind. A few quick taps with a cold chisel eliminated this annoyance in short order.

Improvised Homebrewing

Carl E. Whitney

You don't need experience or expensive tools to build an impressive microcomputer circuit. Your friends will be amazed when they see the remains of your house after you build this display. You can make free telephone calls too.

Are you aching to build your own system, but put off by all the jargon? Do you spend your nights dreaming of a concatenated bit-slice system with cycle-stealing DMA, only to awaken to the sad reality of a broken toaster that you're unable to fix? Has the myth that homebrewing is hard kept you away from a crack at your own Cray-1?

Not to worry. Microprocessors are **smart**. Adaptable. Flexible. They're able to function in less-than-optimum environments. You don't have to worry about having everything connected perfectly—just hook the micro into a circuit and watch the lights flash. Improvised homebrewing is fun, inexpensive, and so simple that even a systems programmer could do it!

The first step is easy—just find a T.V. that isn't working. Attach a chip to the chassis with masking tape and start running wires to likely-looking spots. Make the connections with alligator clips so that you can change the circuit if it's not up to snuff. If you have a soldering iron, you'll want to solder a few of the chip's pins together—this helps the signals move around inside the micro, greatly improving the performance of your system. (Manufacturers always provide twice as many pins as are necessary, so as to impress buyers.)

There's only one critical step here. You must connect the Vss pin directly to line voltage. Otherwise, the micro won't have enough power to operate. While five volts is enough in an ordinary circuit, your baby needs a full house so it can dope out its configuration and go to work for you. Simple division shows that it will run twenty-three times faster on 115 volts than on five.

You don't need expensive equipment for checkout. Just disable the T.V.'s power interlock so that you can get a closer view of the action. If your bird doesn't fly on power-up, then poke around with your fingers to find the dead spots. A little tingle means about 10 volts. A strong rush means 50 or 60 volts. Try to avoid hitting anything over 100 volts. Just put a screwdriver between the suspected high voltage and ground—if the spark is intensely blue and makes a loud, sharp sound, then the voltage is around 300. Since you don't need that much juice, turn the T.V. off, and run a line from the high voltage to ground, so as to soak up the excess energy.

You'll probably get some brilliant video displays, at least for a while. Configuring your system for number-crunching, though, will take some doing. Try wiring in flashlights four at a time to provide a hex readout. You can build an interface to a calculator, but this takes some skill—microprocessors are very jealous of each other, and each one likes to have its own circuit.

A modem? It's easy. The main thing to remember is that telephone circuits are grossly underpowered. They're **starving** for more watts. So, cut your telephone line and strip the wires with a kitchen knife. Take your soldering iron and connect...

Or say you want to make calls free to your computer-using friends on the other coast or in Hong Kong or Japan. Then you need a telephone "blue box". This is a somewhat more advanced project. The circuit diagram for the logic board is shown in Figure 1. Wire this up and wait for next month's issue.

Next month: the blue box tone generators and how to hook it all to your computer to make 4096 simultaneous long distance calls free.

(Note: this is for information only. Using a blue box is against the law and Ma Bell doesn't like them at all.)

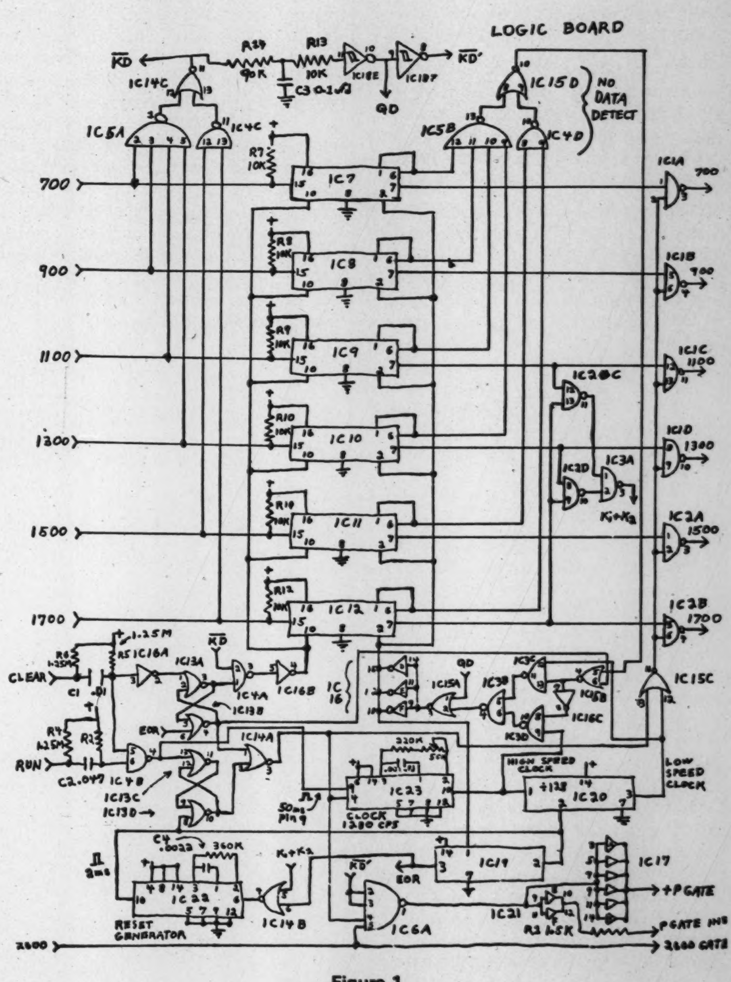

LOGIC BOARD
KD
KD'
R24 90K
R13 10K
C3 0.1
IC18E
IC18F
QD
IC14C
IC5A
IC4C
IC15D
NO DATA DETECT
IC5B
IC4D
R7 10K
IC7
IC8
IC9
IC10
IC11
IC12
700
900
1100
1300
1500
1700
IC1A
IC1B
IC1C
IC1D
IC2A
IC2B
IC20C
IC2D
IC3A
K1+K2
CLEAR
RUN
C1 .01
C2 .047
R6 1.25M
R4 1.25M
R5 IC16A
IC13A
IC4A
IC13B
IC16B
IC16
IC15A
IC3B
IC3C
IC15B
IC16C
IC3D
IC15C
IC14A
IC4B
IC13C
IC13D
EOR
IC23
CLOCK 1300 CPS
HIGH SPEED CLOCK
÷128
IC20
LOW SPEED CLOCK
C4 .0022
360K
IC22
RESET GENERATOR
IC14B
IC6A
IC19
IC21
R1 6.5K
IC17
+P GATE
PGATE INH
2600
2600 GATE

Figure 1

LETTERS

MAINTENANCE TIPS

Dear Editor:

The article "A Simplified Guide to Hardware Maintenance" in the July issue (page 124) prompted me to pass along several maintenance tips I have found valuable over the years.

1) If your CRT screen contracts occasionally, try removing the plug from the yoke, rotating it two pins clockwise, and plugging it back in. If it refuses to fit, give it a sharp rap with a 9- or 10-pound sledge hammer.

2) Disk drive read and write errors can be corrected by rubbing the recording surface of the diskette with 120 - grit sandpaper. If this does not correct the problem, mount a large horseshoe magnet an inch or so from the drive head.

3) If your CRT enclosure seems to get moderately warm during normal operation and is not equipped with a cooling fan, simply spray the interior of the unit with a good dose of cold water. (The little brass sprayer for plants works just fine.)

4) If your power cord is getting frayed or has little cracks down near the plug, just run to the hardware store and get some of that black electricians' tape. Wrap five or six turns around the suspect area and it'll be good for a lifetime. (Don't forget to pull the plug out by the cord, and at a 90 degree angle!)

Tom Hudson
Springfield, MO

BAD RADIATION

Dear Editor:

I am consistently getting **bad radiation** from the Radio Shack TRS-80 microcomputer. "Creative Computing" printed letters about bad radiations in the September-October 1977 and the January-Febuary 1978 issues but I do not know how to tell whether they are relevant.

My experience with the TRS-80 is that I get "sunburn" (especially on the **right** side of my face and body), wrinkles on my face which appear overnight and won't go away (I look **older** because of it), the healing of minor cuts, etc. is **much** slower and it leaves a scar, altered state of consciousness (for the **worse**) and altered perception (vision, way of seeing things), feeling stupid and very significantly lowered mental abilities which lasts for about two or three weeks, loss of potency for several days, strange dreams, depression, nausea, slight abdominal pain, lethargy, slightly impaired right hand (with which I type), eye spasms for at least a week, less energy, and very short temper. Also, a feeling inside which I can't really describe but I call it a "burnt" feeling. And I think that using the TRS-80 might have also made me more adversely susceptible to the radiations from an ordinary television screen **and** the CRT.

Over the past two years I have dared use the TRS-80 only four times and I have gotten the same bad effects with both Level I - 4K and Level II - 16K. I don't use it anymore because the results on me are very bad and persist for a long time. (But the noticable effects **do** go away eventually except for the wrinkles and perhaps there is some very slight permanent loss of mental abilities. Also, I have no way of knowing whether it will result in cancer in about twenty years.)

I do not know of anyone else who has had such a bad experience with it but I hope that you can believe this. I am **not** exaggerating. I don't know what kind of radiation it is. I have had the TRS-80 checked for radiation but nothing unusual was found. I suppose that there are **some** people who are much more susceptible to the radiation than **other** people. But I don't know **why**.

I hope that you can find and publish a way to **avoid** all these bad effects.

Steven Cohen
Kim Buc, NJ

GUERRILLA WARFARE

Dear Editor:

Are you fed up with global aggression? Even as you read, growing numbers of intrepid computer warriors are fighting a cruel and ruthless alien force that makes Klingons look like creampuffs. These Invaders, led by a superior intelligence, HATA, have taken control of countless numbers of Apple computers, and constantly engage our warriors in fierce battles.

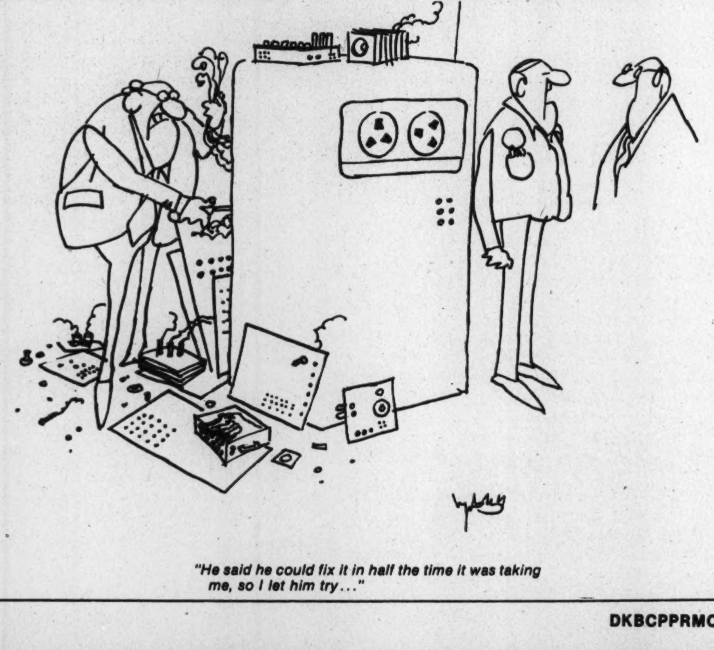
The warriors themselves, are distinguished by their unusual black and blue, or calloused left thumbs. They are, however, seldom deterred by these 'mortal' wounds; as long as they can still press the firing button.

Do you have a strong thumb and a weak mind? Vent your frustrations! Take on this Apple invader and kill a few aliens in your spare time.

All Thumbs
Tewksbury, Massachusetts

P.S. Coded message for fellow warriors—
50:A2 0F B5 59 9D 33 05 CA D0 F8 CC AE C5 AE D4 C8 CF CD C1 D3 A0 B4 B4 B5 B0

When you see a situation you cannot understand, look for the financial interest.



"He said he could fix it in half the time it was taking me, so I let him try..."

Your mini-computer may be insured, but let's see how fast it can forget everything it ever learned.

Chances are you've never even thought about insurance on your mini- or microcomputer. Why should you? You're not running tons of DOD stuff and student activists are more interested in other targets lately.

Well, you should worry because you really depend upon your computer much more than you think. Also, you may be able to collect some bucks for that obsolete 10-month old computer that has just been replaced by a new model. Really good insurance might even cover the cost of replacing your tape reels and disks too. After all, most insurance investigators don't know that tape stays on the reel and floppy disks stay in their housings. Just take some empty reels and tell the investigator that the tape and disks containing your priceless data were inside the machine when the fire struck. Or flood. Or earthquake.

Earthquake damage is your best bet for a fraudulent claim. Show your insurance examiner box after box of floppy disks, all of which now bend as a result of the earthquake. Show him/her that the bending is worse than any fire could ever be since the data bits cannot tolerate excessive flexing. Show him/her that this is the equivalent of a rubber check and it cannot be tolerated in your ship-shape operation.

What about the actual information on those disks? If the disks bend even 0.005 cm, you've lost that information. Which makes your computer useless until you reproduce that data. And that costs money.

So the SaltPeter, the same folks who brought you your first computer upchuck in 1961, have written a new policy especially for mini and microcomputers. Not only will we replace your hardware, we will also replace your empty tape-reels and disk jackets.

And of course there are plenty of "screw the policyholder" options available. With the new mini/micro computer policy from the Salt Peter we can help your computer remember everything it forgot.

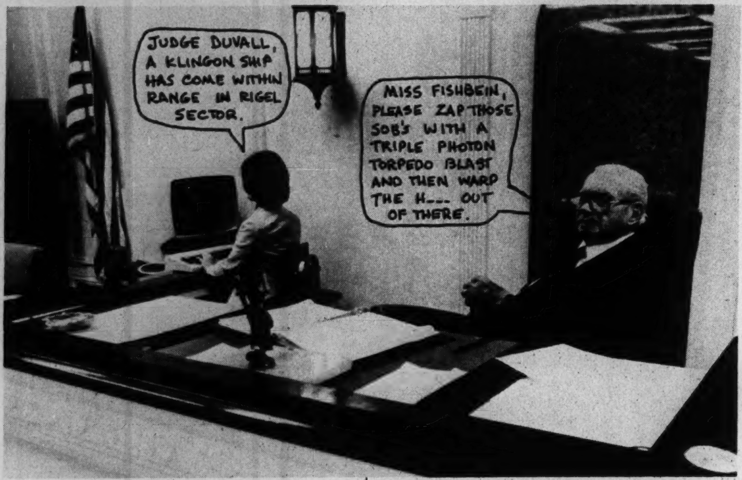
So don't forget to look in the Yellowed Pages and call an Independent Agent representing the Salt Peter the next time you're looking for a way out of a financial fix. Torches available at slightly extra cost.

We keep raising insurance rates.

Diskette 2D

The Salt Peter

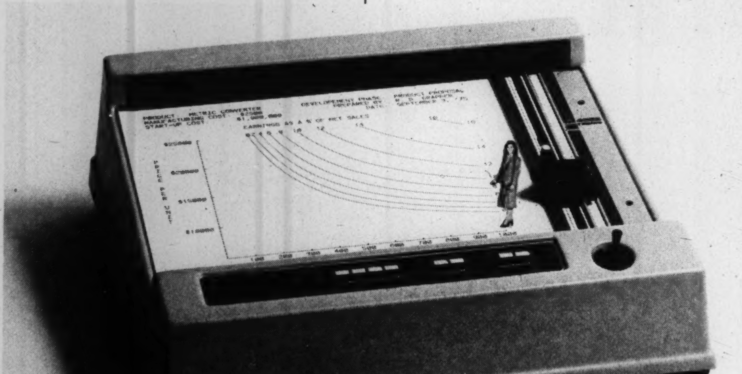
COMPUTER IN THE COURT


JUDGE DUVALL, A KLINGON SHIP HAS COME WITHIN RANGE IN RIGEL SECTOR.
MISS FISHBEIN, PLEASE ZAP THOSE SOB'S WITH A TRIPLE PHOTON TORPEDO BLAST AND THEN WARP THE H--- OUT OF THERE.

Tarrant County Court Judge J.C. Duvall keeps a computer terminal on his courtroom bench and frequently asks his clerk to check the past record of a person appearing before him. The terminal is tied into the county's criminal justice information system and provides instant access to case files stored in the IBM computer. Says Duvall, "Occasionally I have a case and don't have the complete criminal record in front of me. I can use the computer to find out if the person has been arrested before, how many times he's been in jail, and if he's out on probation...I owe it to myself and the public to know as much about a person as I can before I pass judgment."

HUGE FLATBED PLOTTER

Said by its manufacturer to be the largest ever constructed, this new plotter from Textronik outperforms most other plotters in speed and accuracy. The plotter arm is driven by a 700 b.h.p. diesel engine and moves at speeds up to 45 m.p.h. Operator controls respond easily when jumped on. Intended applications for the plotter include billboard art and graphs of the price of Arabian oil. A two-week factory training course is available for operators of the plotter, since special skill is required in the handling of the plotter paper and changing pens.



COMPUTERS NEED AIR

Results of a recent study conducted by Professor Arnold Tom at the University of Connecticut revealed the need to "air out" computers.

The controlled experiment proved Professor Tom's hypothesis that like plants, animals and toilets, computers will benefit from a little sweet-smelling fresh air.

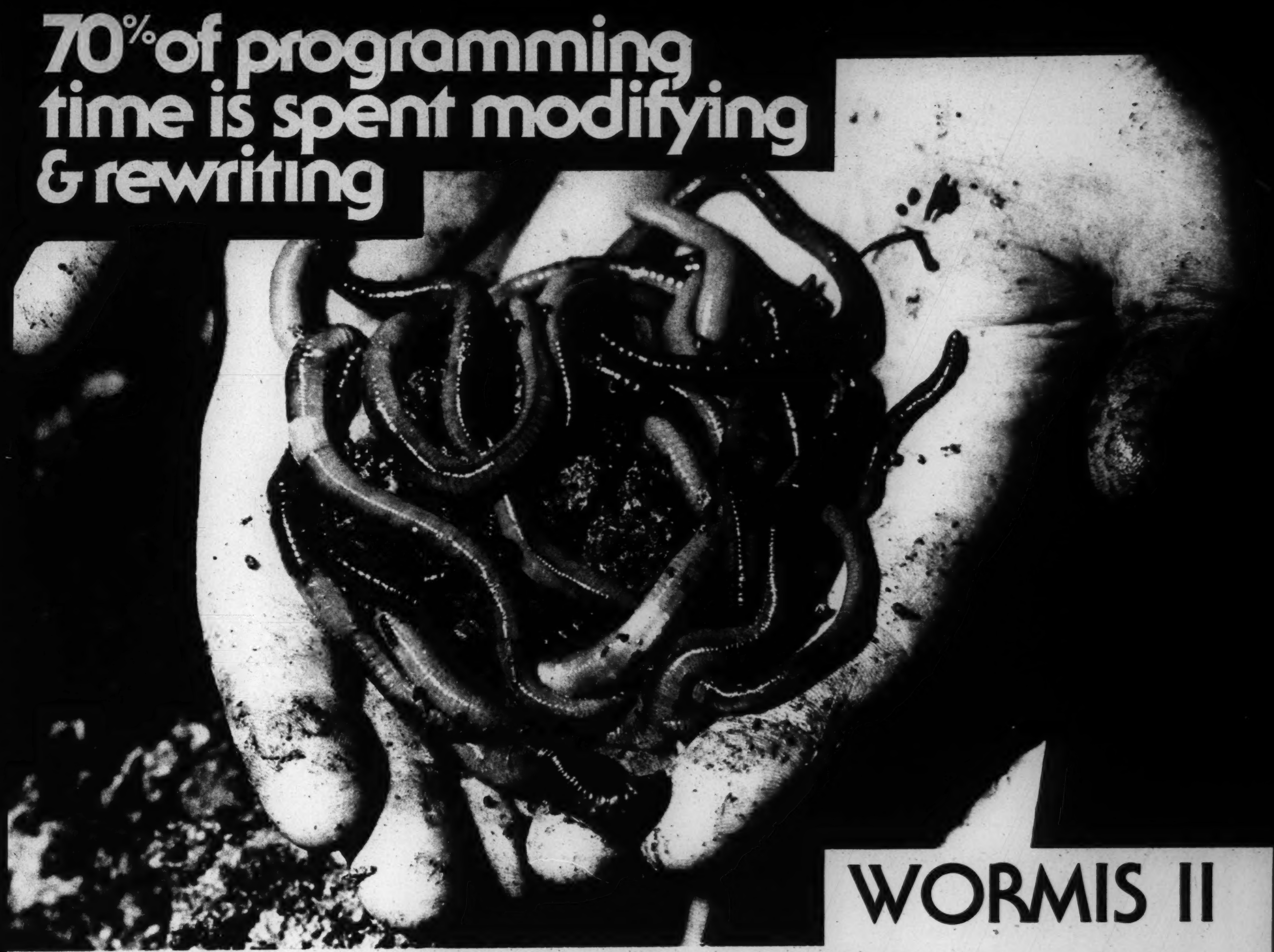
The weight of the computer and the wind velocity are factors to consider when deciding how much air is best. The Professor recommends the following dosages for maximizing your computer's performance: For a 30-70 lb. micro, air about once every other day for two hours when winds don't exceed 30 MPH. In the event of high winds, air 10 times a day at half-hour intervals. If you have access to a large system (immobile), use a fan. Set it on high for two hours, medium for 10 and low for 12 hours every day the computer is in use.

Manufacturers are presently testing to see if individual systems require varying degrees of air. All are anxious to design a computer requiring little to no air because they fear this airing process will be an inconvenience of computer operators.

Federal law, however, now requires that all manufacturers of computers provide instructions for airing time engraved on the front panel where it can act as a reminder.

CDC METRIC CONVERSION

Control Data Corporation has announced a 2000% increase in the price of its products. The reason for this increase, according to CDC, is that their entire product line is being converted to metric. All internal calculations will be done in metric, rather than the old-fashioned out-of-date English units. Owners of existing CDC computers are advised to contact their CDC representative about updating to the new metric versions of all software (including metric COBOL). It is believed that CDC is the first company to convert to the little-known but quite powerful binary metric system, but other biggies are expected to follow. In fact, there may be a sudden glut of unwanted English unit computers on the used computer market.



WORMIS II kills bugs before they become worms.

Recent studies indicate that, in order to keep programs current with OSHA regulations, up to 70% of the efforts of a typical programming department are spent modifying or entirely rewriting programs that were done at least once before.

How can you find the time to develop productive new systems?

WORMIS II

The data independence built into WORMIS II dramatically reduces the time spent on maintenance. With WORMIS II, program modules are kept completely independent of data, thus the data have no effect on the running of the programs. Furthermore, the programs have no effect on the data.

This is all possible because WORMIS II is both a data base storage system (like a large box) and a complete English-like nonprocedural language (like Basic).

With WORMIS II, you just say what you want. You don't have to tell the computer how to produce it. Even if you did, it wouldn't because it knows what's best for your data. That means no time-consuming changes every time you change the data base.

There are 3.4E12 ways WORMIS II can affect your data processing. We'd like to tell you about them in our free WORMIS II factbook.

We're Arithmetica, a policy consulting, software burial and technical gobbledygook firm involved in the improvement of computer data without programs.

For your free WORMIS II Factbook, call (312) 663-0884 today!

ARITHMETICA

The brains behind WORMIS II.

SOURCE DATA

MOVIES

BLOOD COMPUTERS FROM OUTER SPACE

directed by Uall Maylaugh

The recent successes of such movies as *Close Encounters* and Star Wars have shown that high-quality, totally believable science fiction movies can be made. And so we set out, with high hopes, to see Blood Computers From Outer Space. I know that sounds like something you might see at 2 A.M. on a small third-rate TV station. But, I knew that this was a real movie, not on TV, so I wasn't fooled. (Readers who find the reviewer incoherent are reminded that constant exposure to computing machinery has literally rotted out his mind and has left him only a shell of his former self, but we keep him around the office to remind us of better times — Ed.).

The crux of this movie is that hemophiliac computers, delivered in a UFO at least twice as big as Devil's Peak, are beamed down using a transporter by a Wookie. These hemophiliac computers, which are able to transport themselves far and wide by a process not yet understood by modern science fiction, bleed all over everything. It is not yet known why computers should bleed all over everything with motor oil, but we will permit the director to use his artistic license and not question the unbelievability of this element.

The climax of the movie occurs when the blood computers return to earth to look for records of their ancestry at Xerox. Fortunately there are enough copies for all of the blood computers, and they return to the UFO from which they came, in a highly moving scene.

We recommend this film with our life to anyone who falls asleep at movies. We discourage the use of the "gore goggles" but look forward to seeing a 3-D version of this movie, or possibly one in Smell-O-Vision.

— L. Harrison

There are two sides to every question and if you want to be popular you take both.

All looks yellow to a jaundiced eye.

BOOKS

PATENT SOFTWARE

by Irving Snell

The author, a practicing chemical engineer and amateur lawyer, details the fascinating history behind his pioneer achievement in the patent software field. Working in his home computer laboratory, he accidentally dropped an entire box of punched cards into a vat containing a dilute solution of tannic acid. The cards, which contained the source code for an APL to BASIC translator program, became coated with a non-putrescible substance, impervious to and insoluble in water, and took on a very high sheen. Snell maintains he was subsequently able to clean up the program with only a few wipes of a soft cloth. The book goes on to review the legal battles that raged for years, as he represented himself and took on the prestigious law firm of Hyde, Hare, Harness and Tanner to win his now famous patent. Must reading for the computer history buff.

Published by Prentice Hill & Sons.(1978, 371 pp, index, $12.95).

— A.B. Salisbury

TRANSCENDENTAL METALANGUAGES

by U.B. Sorri

This book grew out of a set of lecture notes used by Professor Sorri for his graduate course on "Computer Architecture for Anesthesiologists." While the book has nothing to do with computer architecture, it is Sorri's only published work which justifies its status as the required text for the course. Chapter 1 reviews the evolution of computer languages from SANSKRIT (Symbolic Archeological/Narcolepsical System and Klingon Rehabilitative Interpretive Translator) to APL (All Purpose Language). Chapter 2 then develops the theory underlying metalanguages and transcendental functions, with emphasis on the total lack of the practical applications. The highlight of the book is in Chapter 3 in which the author reveals techniques for the selection of the proper "Persontra Function" which will yield a minimum complexity translator or compiler for any given metalanguage. Each chapter contains several representative problems suitable for either homework exercises or doctoral theses, plus a bibliography citing irrelevant works by friends of the author.

Published by Perishor Publishing House, Inc. (1979, 34 pp, $125.00).

— A.B. Salisbury

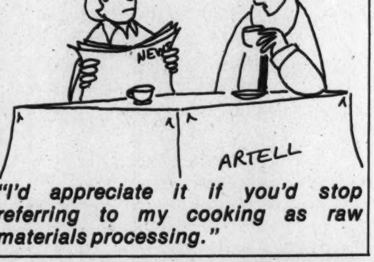
PROGRAMS - ALGORITHMS= DATA STRUCTURES

by Niklaus Worth

In this mind blowing new book, the eminent Dr. Worth describes a new concept in computer programming. New and previously unimagined data structures may be uncovered by taking existing programs and removing all the algorithms. Examples given in the book are in the RASCAL language itself implemented in RASCAL thus allowing the RASCAL language to remove all its own algorithms and cut execution time to a minimum. The book emphasizes "natural organic invention of new data structures, rather than by artificial, contrived, pretentious intentional means." Must reading for all involved in state-of-the-art programming methods.

Published by John Wisley and Daughters. (1979, 256 pages, no contents or index, $24.95).

— S.C. North



"I'd appreciate it if you'd stop referring to my cooking as raw materials processing."

My, what big ears you have, Roger.

The better to hear with.

And what can you hear?

All sorts of things that can help you when you want to be first out with a new product.

Our ears can tell you about the new Apple III. Or the TRS-90. Or the TI 99/7. And hundreds of other machines that can affect your company.

But even better than that we can get you a copy of the blueprints, the operating systems, the software packages, and even the chips themselves.

We hear all this because we have more people in more offices and have bought off more people in more companies than any other industrial espionage operator.

We're the ones that sold the secrets of transistor radios, television, and electronics to the Japanese. They're after us now for all the computer secrets and we'll have to sell out unless we can find willing buyers in the good old U.S. of A.

Want to get in the big league?

Just call us. Proprietary software packages start as low as — well, you just won't believe the price. Easy credit terms available through our parent company, AIFAM.

Don't call us just for our extraordinary ears.

But because it's the only way you can survive in this dog eat dog world.

The AIFAM Companies.

Let us take the risks. (212) 936-5454.

0F

DP Firms Support Carter's Brain

By Evad H. Lha

World leaders are envious of Carter's computer/brain connection.

WASHINGTON — Despite doubts about how effective his brain can ever be, U.S. data processing firms expressed support last week for President Carter's plan to wire all the computers of the country through a special communications interface into his brain.

Most industry officials said they would await clarification from the Administration about which products would be wired into the brain before commenting on how the action would affect their companies.

Mainframe manufacturers, notably Control Data Corp, Honeywell, Sperry Univac and IBM, stand to lose millions of dollars as a result of the edict since they are currently selling a great deal of computing power to the White House which under the Brain Plan presumably would be reduced.

Privately, some company executives conceded that the lost revenue might be made up if other country and company heads decide to follow President Carter's lead.

One industry anaylst, however, called these public and private statements "gobbledygook to hide their true concerns."

Commenting for the Computer Business Equipment Manufacturers Association (CBEMA), Director Namfuak Dyoll said the industry is supporting the presidential action "for now, because something had to be done. Without DP assistance, Carter's brain is just too weak to deal with the other world leaders who can easily out-think him on any subject except, perhaps, peanut farming."

Namfuak said there is "so much vageness at the White House now" and within the government in general, that the industry can only wait to assess the impact of Carter's action. He quipped that "the hat industry is going to love this because Carter will just have to wear a big hat if he doesn't want everyone to see those bundles of cables running out of his head."

An AT&T spokesperson said that the Western Electric unit of the Bell System had offered to provide a fiber optic cable about 1/8″ in diameter to replace the bulkier 5″ diameter cable now proposed. IBM, however, objected on the basis that AT&T, under the 1967 consent decree, is not allowed to provide computer data processing services. The Justice Department also refused to approve the link pointing out that if the suit to split up the Bell System is successful then part of the cable would be under the jurisdiction of Western Electric and the connectors under C&P Telephone and the firms might elect to use different communications protocols.

Jody Powell, commenting for the White House, said that Carter was looking forward to having an expanded brain. Carter is quoted as saying, "now I'll be able to figur ot jus wat thos Afganistainiams are tryin ta do."

Barge Line Can Always Pinpoint Its Fleet

by Gorf Timrek

BARRENSVILLE, Ky — The Barge Line of Barrensville (BLOB) here uses a unique system to keep track of its fleet of 6 barges and 2 towboats on 18 miles of inland waterways.

With the current emphasis on saving energy, increasing attention is being paid to the use of barges to haul commodities and contraband. Many believe this form of transportation is the most economical and fuel-efficient of all present modes of transportation.

BLOB, together with subsidiaries Barrens Boat and Barrens Terminal, Inc. (BTI), operators of cargo terminal facilities, comprise the Waterways, Holding and Terminal (WHAT) division of Arkansas Air, Rail and Gas Holding and Hijacking Corp. (AARGHH). Currently the company moves more than 1 million pounds of various commodities, including coal, coke, grain, hash, rock salt and other white powdered ores each year.

The on-line towboat and barge locater system is implemented on a Univac 90/80-3 computer system to which 65 Uniscope 200 and 40 UTS 400 CRT terminals are connected. The terminals are distributed between the Barrensville headquarters and regional sales offices located in Harlem, Brooklyn, Newark, South Bronx, Baltimore, Boston Combat Zone, Chicago, Detroit, Miami, Watts and buying offices in Mexico and Honduras.

Unlike other barge companies, BLOB owns its entire communications system and maintains a radio station, WLRT, here. WLRT is capable of communicating alerts to towboats that may have strayed as far as 4,000 miles away. A fleet of 20 fast, low-flying aircraft is also maintained by BLOB to search for lost towboats.

In operation, towboat and aircraft captains report six times daily via radio to WLRT. Their reports include operational data including large barge drops and pickups made since their last radio contact. The radio operators at the station input all messages received into the computer's data base via Uniscope 200 terminals.

The computerized BLOB information system transmits to each regional office all information about the company's boats and barges in that region and stores all information as permanent records. For safety purposes these files are stored in the homes of BLOB executives in Barrensville. A unique software system converts and records all these data in an entirely different format for use by auditors and the IRS.

C. Sretep Dlanod, director of management information systems for BLOB, noted that the company was the first barge line to develop a locater system for its vessels. "From the information we receive from the system, we're probably ahead of anybody else in our distribution system. We can pinpoint the most profitable areas of business and likewise determine those sources which must be eliminated because of marginally profitable or unprofitable operation," he added.

Biological Breakthrough

Computer study proves turtles are extinct.

An important computerized breakthrough in the field of biology has recently been reported from Mildew University. Using the combined computing power of a consortium of Sphere, Scelbi, and Sol Computers, Professor Octave Galoot has proven, without a reasonable doubt, that turtles became extinct over sixty-seven million years ago.

Dr. Galoot's computations indicate that turtles may not have even existed at all. What we today regard as turtles, he asserts, are merely self-propagating disk memory units, left behind millenia ago by extra-terrestrials, whose very-long-term plan was to incubate our present peripheral-memory industry. A commendable enterprise, if true.

The Professor plans to publish his findings in a forthcoming edition of *Computer Confabulations*, which is abstracted in *The Review of Obscure Journals.*

So What Else is New?

ACS Delayed

AT&T's much talked about Advanced Communications Service (ACS) is, according to a Bell System EEOC Spokesperson, on the verge of being released. Under intense questioning, s/he admitted that this statement had been made at least 23 times previously.

ACS was originally conceived in the fertile minds of several former IBMers who were lured away from IBM for the fun and challenge of working for AT&T's newly-formed marketing

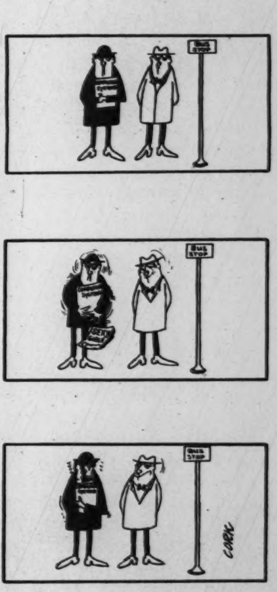
[*continued in Sept. 1980*]

PERSONALLY, I THINK THIS LINE PRINTER STINKS!

UK visit

The industrial application of computers seemed to be of particular interest to the Chinese Academy of Sciences delegation which recently returned to China after a tour of scientific establishments in Europe.

Led by the vice-president of the academy, Hu Ke-shih, the seven scientists and the director of the Bureau of Foreign Affairs, Hoa Ting, included a visit to the BNF Metals Technology Centre.



Bake Your Own Computer

Michael Shafto and Peter Worland

Dumb User Heuristics (DUH), Inc., has purchased a controlling interest in the Nebraska Biscuit Company (Nebrasko). This move comes on the heels of a reported DUH breakthrough in minicomputer architecture. According to a company spokesman, DUH will soon be able to market an affordable, multi-user minicomputer system built around the "crispware" concept. "It's a combination of hardware and software," the spokesman explained. "We can't release the details at this time, but I can tell you we project **very** low production costs."

The following inside information was obtained from a former Nebrasko cookie-icer: The crispware system is based on an architectural innovation known as the Mother Hubbard board. This board features a light, multi-layer configuration of wafer-like components. Our source described it as "flaky."

For use with the MH board, DUH/Nebrasko is reported to have developed three special-purpose chips. For text-processing, especially business form letters and academic writing, there is the buffalo chip. For game applications and Monte Carlo work, there is the poker chip. And for standard numerical calculations, there is the mysterious new chocolate chip. OEM's take note: It is rumored that this chip can even be preprogrammed to self-destruct via melt-down after a variable length of time (dependent upon warranty schedules).

Hansel-und-Gretel Gesellschaft of northern Germany has designed and engineered a baked-in operating system for the DUH/Nebrasko mini. "We never **burn** anything in," the H-u-G engineers have been heard to boast.

Two types of memory will be available: The bubbly memory, in non-returnable bottles, or the less expensive apple-core memory. Although the core memory is more readily available, it must be kept under refrigeration to prevent its decaying into moss. (The entire system is natural — there are no artificial preservatives.)

Multi-user Non-combustible Hardware (MUNCH) will provide a line of compatible external storage media. The standard configuration will include integral dual waffle disks. The waffle is a mega-bite unit which fits a low-cost drive made from recycled electric toasters. DUH reportedly plans to market the waffle through established vendors. Interfacing with printers, tape-drives, and lab equipment will be possible via cereal I/O ports equipped with versatile flap-jacks. Breadboards will be available in rye, whole-wheat, and pumpernickel.

Two high-level languages, CRUMBOL and CRISP, will be available for string, list, or protein processing. ENZYME XI is available for number-munching. The ENZYME XI compiler optimizes and removes lumps from programs while still maintaining acceptable speed. This is possible thanks to the "crispware combo" of the potato chip and Reverse Danish Notation (RDN).

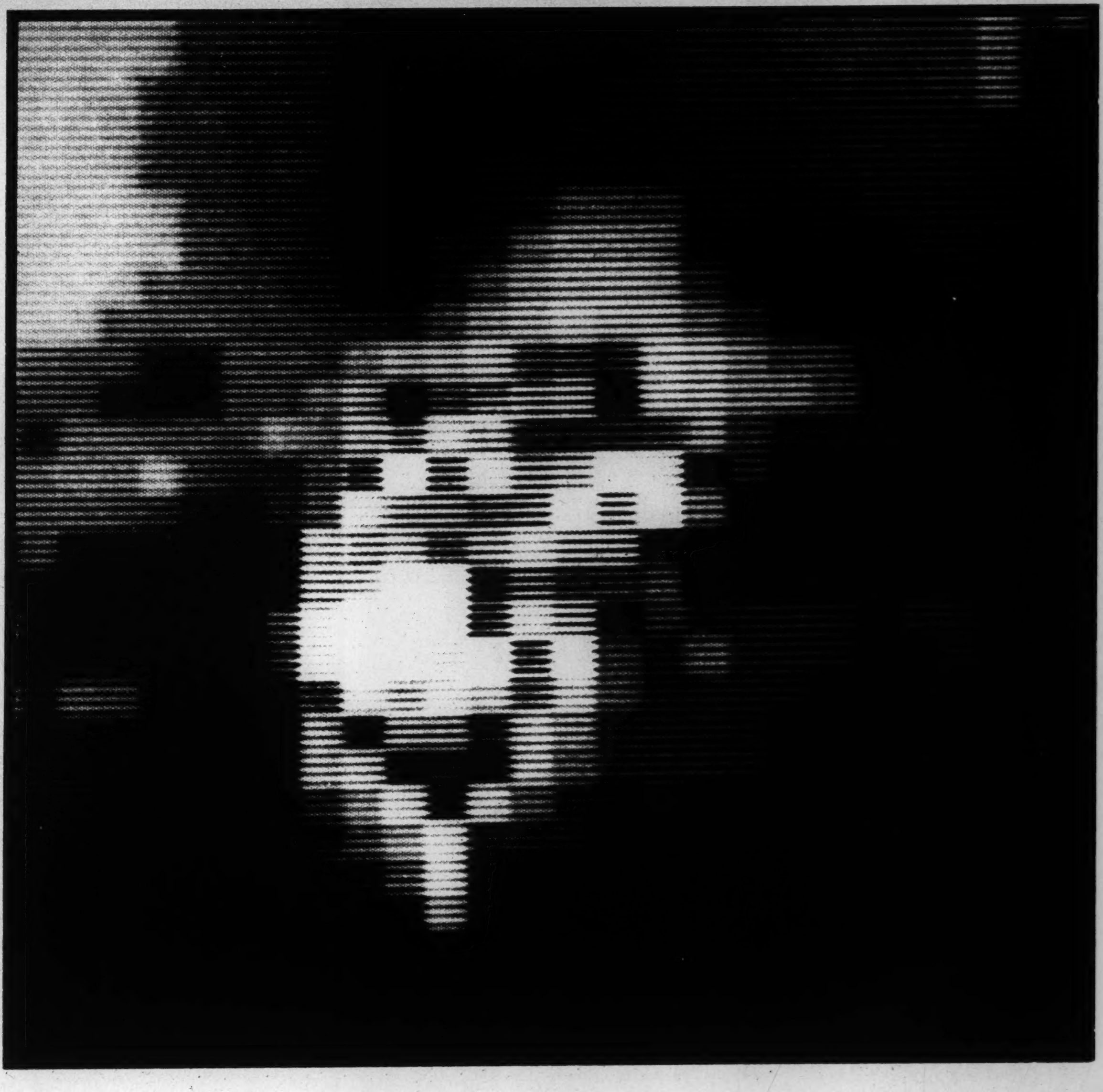
A TV personality associated with the Muppet Show is widely rumored to have resigned from the show in order to accept a high-level position at DUH/Nebrasko. He is reportedly behind the innovative ENZYME compiler, as well as an innovation never before seen in the industry: **blend coding** — an extension of hash coding — which goes **beyond** the bit level to "really mix things up".

Designed with the (dumb) user in mind, these languages are all instant, one-step, quick and easy to use. A "piece of cake," our source said. DUH/Nebrasko documentation has uniformly adopted a cookbook format. One glitch to be alert for, however: certain system parameters have to be toggled in by the user, since their values vary as a function of altitude and relative humidity.

According to our source, one of the most tempting features of the new system will be the maintenance contract. Under this contract a company truck will deliver a new computer every two weeks, along with a gallon of ice cream and selected fresh fruit (in season). The operating system cookbook contains several tantalizing recipes for serving the old system to the data processing staff or the owner's family and friends. (Leasing and rental options will not be available.)

Prices for software and storage media have not yet been established, but the company plans to come in around $2.79 a pound (in quantities of a baker's dozen). Advance orders for large quantities have reportedly been placed by MacDonald's, Howard Johnson's, and **Reader's Digest.**

At the present time, the DUH/Nebrasko sales and marketing division is pressing the engineers. They can't wait to try out their new slogan: "Can you eat IBM?"



Computer ID

Rotide Tseug

As reported in the July issue of this magazine, a computerized system has been developed to identify faces from a matrix of 15 by 20 pixels using six levels of darkness (gray). Following the principles laid down in Professor Leon Harmon's description, Ysteb Selpats home-brewed a system for her SWTPC 6800 computer using an eye lens from a Baby Alive doll, three Edmund Scientific prisms, and an Erector Set mounting. A detuned CB radio (approx. channel -43.7) couples the optical components to the computer without the need for expensive A to D hardware. The results are truly astonishing. Shown here is the face of a well-known public figure scanned directly off Eyewitness News. No doubt who that is, eh? Ysteb is willing to share the plans for this imaginative device with the first five people who correctly identify the person in the image reproduced here. Send responses care of this magazine.

Computer Laws

Brook's Law
Adding manpower to a late software project makes it later.

Clarke's Third Law
Any sufficiently advanced technology is indistinguishable from magic.

Hoare's Law of Large Programs
Inside every large program is a small program struggling to get out.

Laws of Computer Programming

1. Any given program, when running, is obsolete.
2. Any given program costs more and takes longer.
3. If a program is useful, it will have to be changed.
4. If a program is useless, it will have to be documented.
5. Any given program will expand to fill all available memory.
6. The value of a program is proportional to the weight of its output.
7. Program complexity grows until it exceeds the capability of the programmer who must maintain it.
8. Make it possible for programmers to write programs in English, and you will find that programmers cannot write in English.

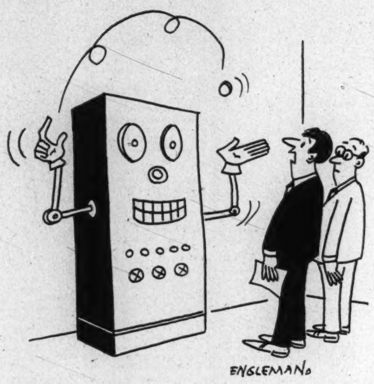
Weinberg's Law
If builders built buildings the way programmers wrote programs, then the first woodpecker that came along would destroy civilization.

The Point of No Return Law
The light at the end of the tunnel could turn out to be the headlight of an oncoming train.

Futility Factor
No experiment is ever a complete failure — it can always serve as a bad example.

On a clear disk you can seek forever.
SDD Song Center

Hollerith got us into this hole mess.
U.S. Census Bureau



"I don't like the way this computer makes decisions!"

©Creative Computing

I/O Deja Vu

A Farce in One Act

IBOX: Hello, CACHE? I'd like the data for location 54321.
CACHE: I'm sorry sir. I don't have that data. Just a moment and I'll try to get it for you.
CACHE: Hello, MAP? I need the address for location 54321.
MAP: I don't have that address, sir. That address is stored at location 76543. Just a moment and I'll try to get it for you.
MAP: Hello, I/O control? I need the data from location 76543.
I/O: Just a moment. I'll try to get it.
I/O: Hello, CACHE? I need the data from location 76543.
CACHE: I don't seem to have that data, and I'm not about to get it.
I/O: Hello, MAP? What is the address for location 76543?
MAP: That address is 222543.
I/O: Hello, CORE? What is the data at 222543?
CORE: That data is INDIRECT PAGE TABLE 21, PAGE 44.
I/O: Hello, MAP? That data you wanted is INDIRECT PAGE TABLE 21, PAGE 44.
MAP: Fine. Now I need INDIRECT PAGE TABLE ENTRY 21. That will be stored at location 556. Would you get me the data at 556?
I/O: I'll try.
I/O: Hello, CACHE? I need the data from location 556.
CACHE: That data is 6767.
I/O: Hello, MAP? That data you wanted is 6767.
MAP: Good. Now, let's see. 6767 plus 44 is 7033. Now, get me the data at 7033.
I/O: Hold on.
I/O: Hello, CACHE? I need the data from location 7033.
CACHE: I'm sorry. I don't have that data. You'll have to get it from CORE.
I/O: Hello, MAP? I need the address for location 7033.
MAP: I'm sorry. I don't seem to have that address. I'll try to get it, but I'll probably forget what I was doing before, so you might as well too.
MAP: Hello, I/O? I'm trying to get the address for 7033. That data should be stored at location 112233. Would you get me that data?
I/O: (sigh) I'll try.
I/O: Hello, CACHE? I need the data from location 112233.
CACHE: That data is 4242.
I/O: Hello, MAP? That data you wanted is 4242.
MAP: I'll store that away. HEY IBOX, I just stored something.
IBOX: Hello, CACHE? I'd like the data for location 54321.
CACHE: I'm sorry sir. I don't have that data. Just a moment and I'll try. . .

Originally appeared in *Computer,* February 1975. Submitted by S. Foonly, Artificial Intelligence Laboratory, Stanford University, Stanford, CA.

Remember How Many Times You Felt LEFT OUT Because You Were BROKE!

Places the gang was going and you couldn't. They all had money for the movies, games, hamburgers and soft drinks . . . all of them except you.

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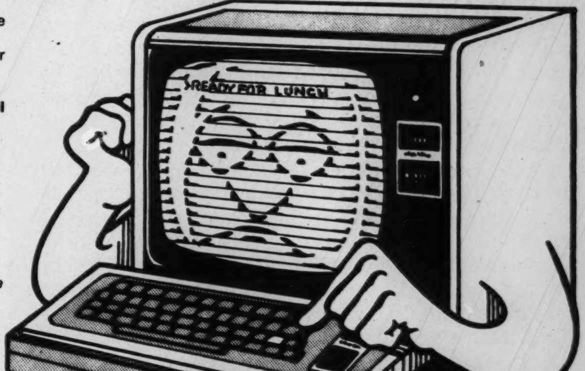
EVEN COMPUTERS GET THE BLUES



Has your TRS-80 been sluggish lately? Slow to respond? Had excessive Keyboard bounce?

Don't blame low voltage or IRON POOR SOFTWARE. Your computer feels **used** and it's up to you, the user to **do** something about it.

The newly-released CYBERPSYCHE Magazine goes directly to the root of your programming problems — your need to develop a **meaningful relationship** with your CPU. State-of-the-art programmers throughout the computer field have realized that little is accomplished by kicking in their CRT's or sending their programs off on endless loops. They're using CYBERPSYCHE to channel these hostilities into constructive therapy for their CPU.

"CYBERPSYCHE helped me explain to my CPU such controversial issues as the need to delete bad memories and the historically bitter tensions between Upper and Lower Case." Ernest Hacker, Omaha, Nebraska.

"After subscribing to CYBERPSYCHE I felt confident when the time came to provide the appropriate handholding to my ROM during expansion of our system or after its first experience with a joystick." Major Oem, Cupertino, California.

"You've made programming a spiritually uplifting experience . . . WOW!" Wimpie Nim, Mountain View, Ohio.

Software Problems? Don't waste your time with irrelevant externals such as programmer incompetency and system inadequacy. Subscribe to CYBERPSYCHE and step into **The Programming Experience.**

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New Hobbyist Language

James Thrig

FORTRAN, CP/M, Pascal APL, BASIC, ALGOL, COBOL... These are some of the various computer languages which have been developed over the years. Each language is, in its proper application, a superb tool. Unfortunately, all of these languages have one common fault. They were developed by and for the professional computer programmer/analyst. A recent *Business Week* article indicated that there were some half million of these professionals in the industry. However, with the introduction of the PET, Apple, TRS-80, etc. it is believed that the number of hobbyist or "weekend" programmers will soon exceed that of the professionals. In spite of the rapidly growing population of this new breed of programmer, no one has yet developed a programming language oriented to the unique requirements of the home/hobbyist marketplace. This article will describe the basic (no relationship intended) structure of a new family of languages needed to meet the special needs of the so called weekend programmer.

Although the term "weekend" programmer sounds derogatory, this new generation of programmer has developed and will continue to develop quite sophisticated special application programs. The label "weekend" is simply used to convey the fact that these programmers are not full time "professional" computerists. Rather, the weekender is one who uses the computer as a work tool, educational or entertainment device. As the weekender is not formally trained in computer programming, his language needs differ from those who have had formal programming backgrounds.

A new generation of programming languages, generically called Anticipatory Languages, are expected to appear in the market in the near future. These languages will have been developed through the use of extensive market research. A large number of focus groups (controlled rap sessions) have brought out the major drawbacks of the current languages. Additionally, these focus groups along with several special surveys have pinpointed the key common elements that are desired by almost all weekend programmmers. With the market for these new languages reaching nearly a quarter million users, it is expected that the first of these new languages will appear very shortly.

The first survey finding is that most current users have already learned to "almost master" BASIC which is by far the single most (by default) popular weekender language. The major problem with BASIC for these programmers is that they quite often forget exactly what a command does. Often these users spend hours tracing down (debugging in professionalese) a rather dumb error caused by infrequent use of particular commands. Rather than force these current users to start from scratch with another langage, the first Anticipatory Language will allow current users to use whatever BASIC commands they want. A set of anticipatory commands will supplement their BASIC directive commands. As essentially a BASIC enhancement, this first langage will be called BASIC Operating Technics of Computer Hobbyists..... BOTCH

While the final command set for BOTCH is not yet finalized the following is a sampling of those known commands that will be included. Their description will demonstrate why this new set of anticipatory languages will quickly become a standard for the weekender. In fact, I wouldn't be surprised to see the professional segment begin to use these languages as well.

RUBE GO(BERG)

RUBE, when used as the first statement in the program allows you, the programmer, to enter program steps in a random fashion. No longer is it necessary to determine the flow of a program prior to entering it into the computer. At execution time simply type RUN GO(BERG), filename. RUBE GO(BERG) will determine the correct flow in your program to provide you with the correct results.

FOR EIGN

FOR EIGN can be used by the weekender, but will probably be most appreciated by those who have had previous programming experience in non Microsoft BASIC languages. Running a program under FOR EIGN control will allow you to use any statements from any language without conflict. Now you can type in DO loops with FOR/NEXT loops. With FOR EIGN you never have to think what language you are programming in, you can use any and all commands ever invented.

NOERROR

NOERROR will replace the ON ERROR GOTO statement found in many current BASICs. ON ERROR GOTO requires programmer to think of what type error may occur and try to catch it. NOERROR commands the CPU to not accept any error. If an error should occur NOERROR will determine its cause, correct it, and rerun the program correctly.

DO WHATIWANT

Many weekenders know what they want to accomplish in their program, but often run into difficulty in explicitly stating their objectives in correct code. DO WHATIWANT will eliminate these problems forever. If you should find that your program doesn't provide you with what you thought you asked for, simply rerun the program under the DO WHATIWANT option. The computer will then prompt you for some added information. After telling the computer what you want, it will rerun the program in accordance with your desires rather than the program code you had proviously entered.

C LONE

This feature will be included in an advanced version of BOTCH. The software is currently being developed, but as of yet, no one has been able to build the hardware interface necessary. C LONE is a new input routine. Most personal computers today use the CLOAD type command to read programs or data from a cassette tape player. C LONE will operate in a similar fashion but will provide a much faster method to write a program. C LONE will accept input directly from the user. Using an EEG (electroencephalogram) signal from the user's brain, C LONE will READ the users thoughts, and via the C LONE interpreter will convert these to usable programmed code.

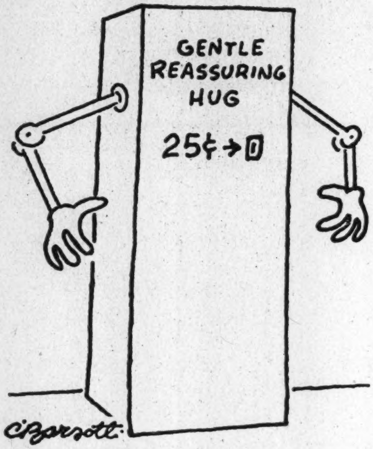
As can be seen from the sampling above, this new family of languages should allow the weekender to be able to BOTCH programs with the same high quality results as that of the professional. Watch for it at your local computer store.

```
                        OVEREXTENDED MNEMONICS

   AME  407 EMULATION                     PAZ  PACK ALPHA AND DROP ZONES
   ARN  ADD AND RESET TO NON-ZERO         PBC  PRINT AND BREAK CHAIN
   BB   BRANCH ON BUG                     PI   PUNCH INVALID
   BBI  BRANCH ON BURNED-OUT INDICATOR    PO   PUNCH OPERATOR
   BCF  BRACH ON CHIP BOX FULL            PPSW PACK PROGRAM STATUS WORD
   BD   BACKSPACE DISK                    PS   PRINT AND SMEAR
   BPO  BRANCH ON POWER OFF               RBT  READ BLANK TAPE
   BSC  BRUST SELECTOR CHANNEL            RCR  REWIND CARD READER
   BSO  BRANCH ON SLEEPY OPERATOR         RCS  READ CARD AND SCRAMBLE DATA
   BTI  BLOW TRUMPET IMMEDIATELY          RD   REMOVE DISK
   CCS  CHINESE CHARACTER SET             RDI  REVERSE DRUM IMMEDIATELY
   CM   CIRCULATE MEMORY                  RID  READ INVALID DATA
   CRN  CONVERT TO ROMAN NUMERALS         RIG  READ INTER-RECORD GAP
   DAC  DIVIDE AND CONQUOR                RBT  REWIND AND BREAK TAPE
   DD   DESTROY DISK                      RNR  READ NOISE RECORD
   DIA  DEVELOP INEFFECTIVE ADDRESS       ROM  READ OPERATOR'S MIND
   DO   DIVIDE AND OVERFLOW               RPM  READ PROGRAMMER'S MIND
   DPK  DESTROY STORAGE PROTECT KEY       RPB  READ PRINT AND BLUSH
   ECP  ERASE CARD PUNCH                  RRR  READ RECORD AND RUN AWAY
   ED   EJECT DISK                        RT   REDUCE THRUPUT
   EIO  EXECUTE INVALID OP-CODE           SC   SCRAMBLE CHANNELS
   EROS ERASE READ-ONLY STORAGE           SD   SLIP DISK
   FSG  FILL SCREEN WITH GARBAGE          SLP  SHARPEN LIGHT PENCIL
   FSR  FORMS SKIP AND RUN AWAY           SP   SCATTER PRINT
   HCF  HALT AND CATCH FIRE               SPSW SCRAMBLE PROGRAM STATUS WORD
   IA   ILLOGICAL AND                     SRSD SEEK RECORD AND SCAR DISK
   II   INQUIRE AND IGNORE                SSC  SELECT READER AND CHEW CARDS
   IOR  ILLOGICAL OR                      SSJ  SELECT STACKER AND JAM
   IRB  INVERT RECORD AND BRANCH          TAB  THROW AWAY BYTE
   LCC  LOAD AND CLEAR CORE               TPD  TRIPLE-PACK DECIMAL
   LMB  LOSE MESSAGE AND BRANCH           TPN  TURN POWER ON
   MC   MOVE CONTINUOUS                   TPO  TURN POWER OFF
   MLB  MEMORY LEFT SHIFT AND BRANCH      UCB  UNCOUPLE CPU AND BRANCH
   MLR  MOVE AND LOSE RECORD              UER  UPDATE AND ERASE RECORD
   MTI  MAKE TAPE INVALID                 UT   UPDATE TRANSACTION
   MWC  MOVE AND WARP CORE                WLR  WRITE WRONG-LENGTH WORD
   NC   1401 INCOMPATABILITY              WNR  WRITE NOISE RECORD
   NPN  NO PROGRAM NECESSARY              XOM  EXECUTE NO-OP AND HANG

CREATIVE COMPUTING MAGAZINE, APRIL 1980
```

Lust



J.H. LEICHMAN

This little gem is based on Dave Ahl's LOVE program which appeared oh-so-long ago.
Apologies to Robert Indiana

```
5 REM                 TA! DA!
10 REMARKABLY DISTORTED BY ME!
15 FILEV#1:"LPT:"
20 DIM A$(65)
25 DIM T$(120,1)
50PRINT"YOUR MESSAGE PLEASE "
55 INPUT A$
60 L=LEN(A$)
65 FOR R=1 TO 14 \ PRINT#1:  \ NEXT R
70 FOR J=0 TO INT(60/L)
75 FOR I=1 TO L
80 T$(J*L+I)=SEG$(A$,I,I)
85 NEXT I
90 NEXT J
95 C=0
100 A1=1 \ P=1 \ C=C+1 \ IF C=37 THEN 200
105 PRINT#1:
110 READ A \ IF A>100 THEN 100 \ A1=A1+A \ IF P=1 THEN 120
115 FOR I=1 TO A \PRINT#1:" "; \ NEXT I \ P=1 \ GOTO 130
120 FOR I=A1-A TO A1-1 \PRINT#1:T$(I); \ NEXT I \ P=0
125 P=O
130 IF A1>60 THEN 100 \ GOTO 110
135 DATA 60,1,12,18,12,5,10,2,3,8,22,8,9,6,4
140 DATA 4,6,24,6,11,4,5,4,6,24,6,11,4,5
145 DATA 4,6,24,6,11,4,5,4,6,24,6,11,4,5
150 DATA 4,6,24,6,11,4,5,4,6,24,6,11,4,5
155 DATA 4,6,24,6,11,4,5,4,6,24,6,11,4,5
160 DATA 4,6,19,1,4,6,11,4,5,4,6,19,1,4,7,9,5,5
165 DATA 4,6,18,2,4,7,9,5,5,4,6,17,3,5,19,6
170 DATA 3,8,14,5,5,19,6,1,29,6,17,7,1,29,13,5,12
175 DATA 4,55,1,3,56,1,2,4,22,4,9,7,9,2,1
180 DATA 2,3,24,2,10,7,10,1,1,2,3,24,2,10,7,10,1,1
185 DATA 2,4,35,7,12,2,24,15,7,12,2,25,14,7,12
190 DATA 3,25,13,7,12,4,25,12,7,12,1,1,20,7,12,7,12
195 DATA 1,1,21,6,12,7,12,1,2,20,6,12,7,12
196 DATA 1,4,17,7,12,7,12,1,27,13,7,12,1,26,11,13,9
197 DATA 1,25,10,17,7,60
198 DATA 5000
200 PRINT#1: \ PRINT#1:PNT(12)
205 CLOSE#1
206 RESTORE
207 INPUT D$
208 IF D$="Y" THEN 5
210 END
```

```
LUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUST
L            USTLUSTLUSTLUSTLUS            TLUST          ST
LUS        TLUSTLUSTLUSTLUSTLUSTL        USTLUSTLU      LUST
LUST      STLUSTLUSTLUSTLUSTLUSTLU      LUSTLUSTLUS    TLUST
LUST      STLUSTLUSTLUSTLUSTLUSTLU      LUSTLUSTLUS    TLUST
LUST      STLUSTLUSTLUSTLUSTLUSTLU      LUSTLUSTLUS    TLUST
LUST      STLUSTLUSTLUSTLUSTLUSTLU      LUSTLUSTLUS    TLUST
LUST      STLUSTLUSTLUSTLUSTLUSTLU      LUSTLUSTLUS    TLUST
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LUST      STLUSTLUSTLUSTLUSTL STLU       USTLUSTLU     TLUST
LUST      STLUSTLUSTLUSTLUST  STLU       USTLUSTLU     TLUST
LUST      STLUSTLUSTLUSTLUS   STLUS                   STLUST
LUS        TLUSTLUSTLUSTL     STLUS                   STLUST
L                             STLUST                 USTLUST
L                             STLUSTLUSTLUS     LUSTLUSTLUST
LUST                                                       T
LUS                                                        T
LU    STLUSTLUSTLUSTLUSTLUST    LUSTLUSTL       LUSTLUSTL  T
LU   USTLUSTLUSTLUSTLUSTLUSTL  TLUSTLUSTL       LUSTLUSTLU T
LU   USTLUSTLUSTLUSTLUSTLUSTL  TLUSTLUSTL       LUSTLUSTLU T
LU    STLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTL       LUSTLUSTLUST
LU                        STLUSTLUSTLUSTL       LUSTLUSTLUST
LU                         TLUSTLUSTLUSTL       LUSTLUSTLUST
LUS                         LUSTLUSTLUSTL       LUSTLUSTLUST
LUST                         USTLUSTLUSTL       LUSTLUSTLUST
L STLUSTLUSTLUSTLUSTLU       USTLUSTLUSTL       LUSTLUSTLUST
L STLUSTLUSTLUSTLUSTLUS      USTLUSTLUSTL       LUSTLUSTLUST
L  TLUSTLUSTLUSTLUSTLUS      USTLUSTLUSTL       LUSTLUSTLUST
L    USTLUSTLUSTLUSTLU       USTLUSTLUSTL       LUSTLUSTLUST
L                           LUSTLUSTLUSTL       LUSTLUSTLUST
L                          TLUSTLUSTLU             TLUSTLUST
L                         STLUSTLUST                 USTLUST
LUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUSTLUST
```

line 5 is absurd - change it

line 15 assigns the lineprinter to output device #1

line 20 sets string length of A$ to 65 characters

line 25 defines 120 strings of length 1 character each

line 80 : SEG$ (A$, I,I) defines a substring in A$ starting at I and ending at I — many systems use MID (A$,I,1)

lines 95 to 130 are pretty much garbled - but they work

line 200 : PNT(12) causes a top of form to be printed

line 207 needs a prompt of some sort

line 208 should probably transfer control to line 15

Ask Me A Riddle

by Lemmik Evets

Here is one of the most sophisticated games ever programmed on any computer. This is no mere Adventure game or Super Invader or Extended Star Trek. No indeed, this is a game that can be comprehended by only the very highest anointed ones of the inner computer hacker profession. DO NOT use this program with your friends who are mere computer enthusiasts. It is well beyond their comprehension. DO NOT show it to mere PL/I, COBOL and LISP programmers. It will confuse them. DO NOT show it to your Polish, Black, Chinese, WASP, Arab, or Jewish friends. It is far too complex for those people to master. In general, it will be best if you keep this program to yourself. Use it as often as you wish, but do not expect others to appreciate it as you do.

Here is a starting riddle for you to enter. "How high is a mouse when it spins?" Answer: "The higher, the fewer."

```
10 REM RIDDLE PROGRAM
20 CLS: CLEAR 200
30 PRINT "ASK ME A RIDDLE..."
40 INPUT Z$
50 IF RND(2)=2 THEN PRINT "GEE...  THAT'S A TOUGH ONE. "
60 PRINT "I'M THINKING..."
70 FOR I=1 TO 2000:NEXT I
80 PRINT "I GIVE UP."
90 PRINT Z$:INPUT Z$
100 FOR I=1 TO 1000:NEXT I
110 FOR J=1 TO 10
120 FOR I=1 TO 50:PRINT@RND(1020),"HA!";:NEXT I
130 FOR I=1 TO 20:PRINT@RND(1020),"HEE-HEE";:NEXT I
140 FOR I=1 TO 10:PRINT@RND(960),"HO-HO";:NEXT I
150 NEXT J
160 PRINT@960,"THAT WAS A GOOD ONE..."
170 FOR I=1 TO 13: PRINT: NEXT I
180 PRINT@128,"TELL ME ANOTHER ONE!"
190 GOTO 40
```

REAL, STOP-THE-PRESS BARGAIN !

WHAT DO WE DO WITH THIS ONE??

When we first saw this "watsit" piled up in the factory warehouse we were so taken by the workmanship and ingenuity of the item that we — talked ourselves into buying all 150 of them. Brand new — still packed in the foam export packing and complete with spare rollers and parts. The closest we can guess is that it is a photocopier paper feed assembly. We were told that it may have been manufactured in Germany by a company called Matt Barley and possibly have been intended for copy machines by Copystatics or Saxon. There is no doubt that these must have cost someone $300 each. A complete network of rollers, plattens, gears, belt drive, ink (or toner) reservoir, guide fingers, clutches, cams and much more. If you repair copy machines or build paper feed mechanisms — at least one of these is a must — if for nothing else than the parts. Seems that the unit is capable of feeding paper from rolls up to 10" wide. That about all we can tell you about it... we invite your order. (23 lbs.) 318SU.

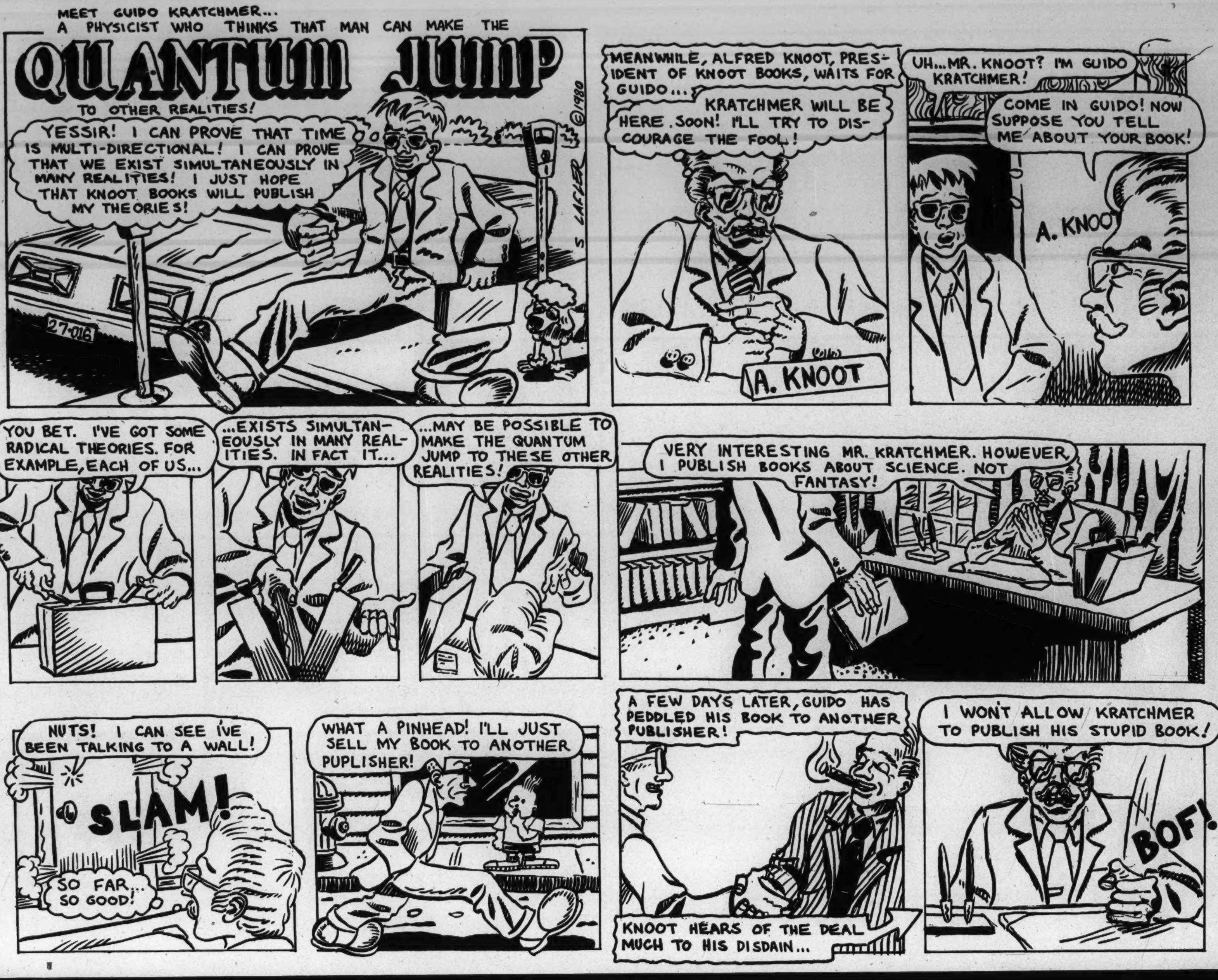
OVERALL DIMENSIONS 14" X 6-3/4" X 7-3/4"

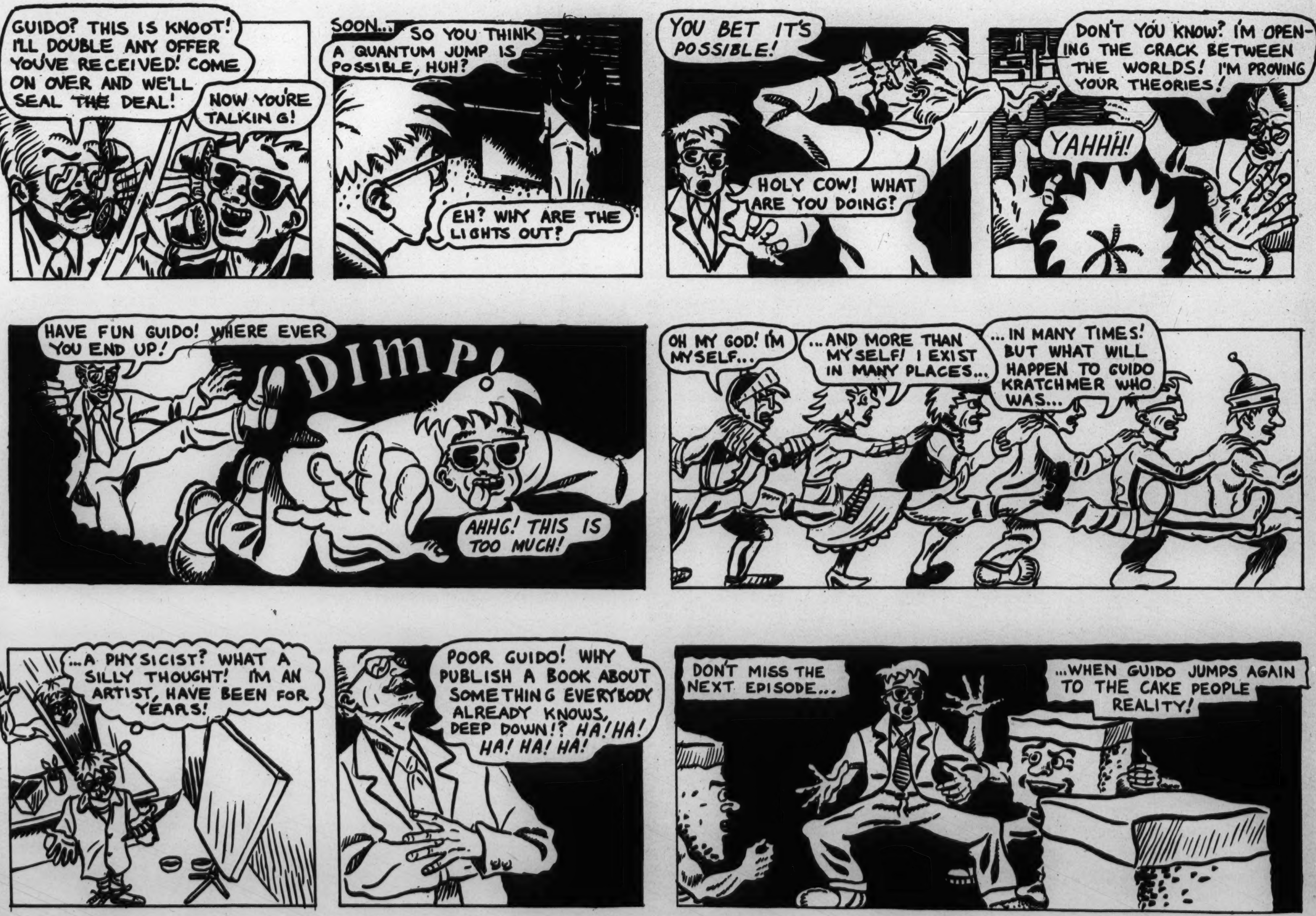
MAKE A LAMINATING MACHINE

ONLY 19.95 WAS 29.95 IN "AA" CATALOG

Sold Out to ETCO PROBABLY BECAUSE NO ONE ELSE WOULD BUY THEM !

NEWS FLASH A customer informs us that these could be for REMINGTON No. 160 offset printing presses!


MEET GUIDO KRATCHMER...
A PHYSICIST WHO THINKS THAT MAN CAN MAKE THE
QUANTUM JUMP
TO OTHER REALITIES!
YESSIR! I CAN PROVE THAT TIME IS MULTI-DIRECTIONAL! I CAN PROVE THAT WE EXIST SIMULTANEOUSLY IN MANY REALITIES! I JUST HOPE THAT KNOOT BOOKS WILL PUBLISH MY THEORIES!
27-016
S LACKER ©1980
MEANWHILE, ALFRED KNOOT, PRESIDENT OF KNOOT BOOKS, WAITS FOR GUIDO...
KRATCHMER WILL BE HERE. SOON! I'LL TRY TO DISCOURAGE THE FOOL!
A. KNOOT
UH...MR. KNOOT? I'M GUIDO KRATCHMER!
COME IN GUIDO! NOW SUPPOSE YOU TELL ME ABOUT YOUR BOOK!
A. KNOOT
YOU BET. I'VE GOT SOME RADICAL THEORIES. FOR EXAMPLE, EACH OF US...
...EXISTS SIMULTANEOUSLY IN MANY REALITIES. IN FACT IT...
...MAY BE POSSIBLE TO MAKE THE QUANTUM JUMP TO THESE OTHER REALITIES!
VERY INTERESTING MR. KRATCHMER. HOWEVER, I PUBLISH BOOKS ABOUT SCIENCE. NOT FANTASY!
NUTS! I CAN SEE I'VE BEEN TALKING TO A WALL!
SLAM!
SO FAR... SO GOOD!
WHAT A PINHEAD! I'LL JUST SELL MY BOOK TO ANOTHER PUPLISHER!
A FEW DAYS LATER, GUIDO HAS PEDDLED HIS BOOK TO ANOTHER PUBLISHER!
KNOOT HEARS OF THE DEAL MUCH TO HIS DISDAIN...
I WON'T ALLOW KRATCHMER TO PUBLISH HIS STUPID BOOK!
BOF!


GUIDO? THIS IS KNOOT! I'LL DOUBLE ANY OFFER YOU'VE RECEIVED! COME ON OVER AND WE'LL SEAL THE DEAL!
NOW YOU'RE TALKIN G!
SOON...
SO YOU THINK A QUANTUM JUMP IS POSSIBLE, HUH?
EH? WHY ARE THE LIGHTS OUT?
YOU BET IT'S POSSIBLE!
HOLY COW! WHAT ARE YOU DOING?
DON'T YOU KNOW? I'M OPENING THE CRACK BETWEEN THE WORLDS! I'M PROVING YOUR THEORIES!
YAHHH!
HAVE FUN GUIDO! WHERE EVER YOU END UP!
DIMP!
AHHG! THIS IS TOO MUCH!
OH MY GOD! I'M MYSELF...
...AND MORE THAN MYSELF! I EXIST IN MANY PLACES...
...IN MANY TIMES! BUT WHAT WILL HAPPEN TO GUIDO KRATCHMER WHO WAS...
...A PHYSICIST? WHAT A SILLY THOUGHT! I'M AN ARTIST, HAVE BEEN FOR YEARS!
POOR GUIDO! WHY PUBLISH A BOOK ABOUT SOMETHING EVERYBODY ALREADY KNOWS, DEEP DOWN!? HA! HA! HA! HA! HA!
DON'T MISS THE NEXT EPISODE...
...WHEN GUIDO JUMPS AGAIN TO THE CAKE PEOPLE REALITY!

Behavior Modification And The Teaching of English Composition

Harley L. Sachs

(This is the report of an Experiment at Midwest Technological University Conducted by Professor Harley Sachs, English Department and Adolph S. Gruber, Professor at Large).

SUMMARY

In response to the national concern for correct English, and faced with an enrollment of students less and less able to express themselves, Professors Sachs and Gruber were awarded an NEF grant of $100,000 to design a program which would make significant changes in ungrammatical behavior at Midwest Technological University. The program rose partly out of a complaint that graduates could not write or express themselves. This was particularly true of engineering students, but the weakness turned up among all majors and even in graduates from the English Literature program.

Using a computer program developed by Prof. Sachs and laboratory carrels modified by Prof. Gruber, approximately two thirds of the freshperson class underwent behavior modification. One third, the control group, received normal instruction in English composition in the usual classes of forty students per T.A., writing not less than two 100 word themes per semester. At the conclusion of the experiment, the behavior mod, or BM group, showed significantly superior grammatical behavior while the control group showed very little progress. Certain aberrations did appear in the BM group and there were several incidents which lead to the subsequent disappearance of Prof. Gruber, but it is felt that these do not in any way affect the statistical significance and reliability of the experiment or its method.

THE PROBLEM

The first report of Mid-Tech graduates being unable to communicate was revealed at a cocktail party attended by a number of visiting job interviewers and Prof. Gruber. Prof. Gruber overheard a peculiar conversation between the personnel manager for Acme Acne, a midwestern cosmetics manufacturer, and one of his employees, a recent graduate in Chemistry and Business Administration from Mid-Tech. When asked a question, the Mid-Tech graduate answered only "true" or "false." Prof. Gruber, curious, entered the conversation and discovered that the ex-student, when pressed for details, was able to reply, "One, two, three, four," or simply, "none of the above." If not given choices he stood mute.

Prof. Gruber's professional concern for language has arisen, perhaps, from the fact that he is German born and was drilled in grammar at an early age. This explains his concern, even though his education is in military history and social sciences with an astrology minor. Nevertheless, he brought the peculiar language patterns of the Mid-Tech graduate to Prof. Sachs's attention and an investigation revealed that the Mid-Tech professors outside the English department had universally adopted a testing and report writing method that required students to do all their homework by filling in, in pencil, the little spaces on machine scorable tests for answers "1,2,3,4 or none of the above."

Aware of the NEF grant program for English improvement, Prof. Sachs and Prof. Gruber immediately set about with a grant proposal. It was funded.

DESCRIPTION OF THE EXPERIMENT

Midwest Technological University has a well-equipped language lab which has carrels using cathode ray tubes (CRT's) and light pencils that allow a student to make corrections and revisions to sentences and paragraphs displayed on the screens. A computer program evaluates each answer. If the student is correct, he is permitted to go on to the next problem. If incorrect, he is required to go back to the appropriate early stage and repeat that training before he may proceed. This programmed instruction is standard.

What Professor Gruber designed was a reward system which would motivate the students to do better work. A survey of preferences for rewards among college Freshpersons at Mid-Tech showed that three rewards were preferred. The first was sex, the second marijuana, and the third alcohol. It was easy enough to program the computer to

---

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Harley L. Sachs, 2242 SW Vermont, Portland, OR 97219

provide color CRT peep shows according to the sexual preference of the student. Upon giving the right answer, the student would be rewarded with a five second segment of a pornographic film which would not continue until the next problem in English grammar was answered correctly. Professor Gruber was unable to obtain a permit to use marijuana and had doubts that the smoke could be confined to each carrel. To blow a puff of smoke in the face of the student with the right answer was easy enough, but some students might have allergies, and the fire extinguishing system in the language lab is smoke activated. This reward was therefore abandoned. An alcohol dispenser was built into eight carrels, providing a shot of beer for each correct answer. On Prof. Sachs' suggestion, the third choice of reward was red hots, small spicy red candies easily dispensed by apparatus borrowed from Skinner boxes in the biology lab. Prof. Sachs preferred red hots to sex or alcohol himself, and admits to falling prey to his own weakness in choosing this third choice of reward, but the results of the experiment prove that this was not an unsuitable choice, even though it did cause an incident late in the second semester of the experiment.

FIRST STAGE OF THE EXPERIMENT

The news of the experiment spread quickly on the Mid-Tech campus and it proved so popular that most of the students in the control group tried to transfer out of their sections and get into the experiment. It became necessary to issue keys and badges to admit only the experimental group to the special carrels in the language lab. English was never so popular at Mid-Tech as it was during the first semester.

However, there were some flaws. Some students discovered that wrong answers sent them back to earlier questions, but that subsequent answers to easy questions they knew got fresh rewards. One or two were caught deliberately recycling the same low level questions. This error was corrected and edited out of the statistical tables (see APPENDIX).

However, Prof. Gruber was not satisfied with the results. It is well known in the academic world that the most popular teacher is not always the best teacher, and this proved true in the Sachs-Gruber experiment as well. Students seemed to enjoy English, it is true, but they did not do significantly better on the post test than those in the control group. Their performance, while improved, was not statistically significant. This prompted Prof. Gruber's redesign of the carrels for the second stage.

SECOND STAGE OF THE MID-TECH EXPERIMENT

Prof. Gruber, drawing on his German background, decided that success in the experiment depended on a NIETZSCHEN application of the pleasure/pain principle. Each carrel was subsequently modified further so that students who gave the wrong answers would receive mild electric shock. For the second phase of the experiment, then, a student would follow this procedure: He/She would enter the language lab, present ID badge and key, and be permitted to sit in a carrel. For the sake of economy, no carrel had all three rewards built in. Students were obliged to choose between a sex, beer, or candy carrel. An attendant, usually a work-study student, would then attach electrical contacts to the ankles of the subject. If the electrical circuit were broken, the lesson would be discontinued immediately.

The student would type into the computer terminal the appropriate codes and the CRT would turn on with the appropriate lesson depending on how far the student had progressed. A short review period without reward or punishment preceded the continuation of the lesson. If the student answered the questions correctly, he/she was rewarded. If the answers were wrong, he/she would not only have to go back to an earlier stage, but would receive a mild electric shock.

It was at this point that a lack of communication between Prof. Sachs and Prof. Gruber developed. Prof. Sachs has certain well-known pet peeves. Students who spell "writing" with two t's, or think "a lot" is one word regularly receive failing marks. Comma splices and errors in agreement have caused many English professors dyspepsia and, if allowed to continue for long periods, even peptic ulcers. These errors caused hypersensitive Prof. Sachs to program the computer for severity: multiple shocks. What he did not know was the Prof. Gruber had begun to exhibit certain tendencies which might be regarded as sadistic. He increased the voltage of the punishment program, making the punishments sequentially more severe by the square of the voltage.

At about this time certain unanticipated side effects occurred. A student who had selected red hots as his reward became addicted to them. Because Prof. Sachs had purchased all the locally available red hots for use in the experiment (and for his own consumption), the addicted student could obtain them only by giving right answers in English. He completed his lessons in the language lab ahead of schedule only to find himself addicted and unable to satisfy his craving. He was found in Prof. Sachs' office unconscious, having broken in, burglarized the filing cabinet where the candy was kept, and having taken an overdose. He was hospitalized, put on a withdrawal program, but was forced to quit school.

Several male students who had mistakenly punched in the wrong codes (Prof. Sachs insists it was deliberate) on the sex track became abnormally fascinated with the pornography segments designed for coeds. By the time they had completed their English behavior modification course they had been modified into trans-sexuals, causing a furor in the athletic program, as one of the students was the star center on the hockey team and refused to use the men's locker room. Parents and fans complained and the center's fiancée filed a law suit against Mid-Tech for alienation of affection.

Other students who successfully completed the English language BM course became alcoholics, a malady fairly common on the campus, but nevertheless undesirable.

The worst side effect and the one that caused the abrupt cancellation of the experiment was the electrocution of two students whose ACT scores in English should have warned Prof. Sachs that they were bound to commit numerous comma splices, errors in agreement, and to spell writing with two t's. Prof. Gruber's progressively severe punishments proved too much for their constitutions. It was an unfortunate combination.

Before Prof. Gruber could be detained for questioning, he disappeared. It was learned that he had drawn $75,000 from the experiment's NEF account and is believed to have fled to Argentina where he is known to have relatives. He is still at large.*

Prof. Sachs was left to complete the findings on his own and to prepare this report. He disclaims all responsibility for the deaths of the two students and can prove statistically that, in a sample of 750 students, the deaths of two are not significant. The transsexual conversions, alcoholism, and addiction to red hots he finds regrettable, but "just one of those minor things that go wrong. They can be designed out of the next phase of the experiment. I'm applying for another grant."

CONCLUSIONS

The combined use of pleasure/pain, reward/punishment in the language lab has a great future, if applied with caution. The experience at Mid-Tech shows that students can be taught answers other than true-false or one, two, three, four, or none of the above. They can be taught to recognize and correct errors in grammar and spelling and can even be taught the correct use of semicolons. With care, some may learn that "a lot" is not one word. Behavior modification allows students to progress at their own pace, to choose their own rewards, and to learn. Additional programs may teach them how to write essay answers, themes and even technical reports. The future is bright for the professor who is willing to do a little experimenting.

FURTHER RESEARCH

The Mid-Tech experiment suggests further analysis, including the long term effectiveness of the rewards. How many correct responses in a single session are optimal; when does the number of shots of beer impair behavior? how long do subjects retain interest in porno flicks? do red hots in large quantities cause cancer? how much electric shock is enough? too much? Grant proposals on these subjects may be expected, and one of them may well earn the Proxmire "Golden Fleece' award.

---

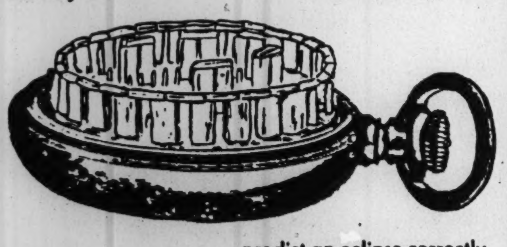
*Prof. Gruber took the data with him, hence no APPENDIX. (Sorry).

GENTLEMEN'S WATCH

New Improved Stonehenge
Calendar Model

MANUFACTURED BY
THE MOST
CELEBRATED MAKER

Fancy Dial



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Philip Hughes

Display, CPU, how a softwere redes
his matrices, paths, and minimax moves.

READ
Yea, though I scan through an array of
random limited response options
I shall prioritize no retrodigms
for my loops are all expedoable,
and cyberment-tabulated rasa
shall megaboost multicope capax.

LOAD
With parameters wide, interface broad,
let my cogito sum, my ego erg:
nanosec mentronics, on a knowlark spree
(yet duly constrained by culturplex sync).

NEST DO LOOPS
Put through thy thruput, compile thy therbligs,
clearscan hyperfect thy daily data
and thou canst not then print false to any man,
Attend to the inwhack and nearfetched.
Look to the glitches and let the shut-downs
take care of themselves. Be wired, boy, be wired.

FILE
Oh, what a noble programming is mine,
in core storage how rich, in execution how fleet.
Pray you: just press this button.

PRINT BOTTOM LINE
--The proper study of mindken is canned.--

Horrendous Hardware Introduces CompuCar

Kirk Niatpac

We recently had a chance to review the CompuCar, an exciting new extraordinary amazing fantastic new product made by Horrendous Hardware. (Disclaimer: Any relationship with a division of This Magazine is purely coincidental and this review should be misinterpreted as an example of abuse of editorial power. —Ed.) Originally we had planned to do a Battle of the CompuCars but we only had one so there was no point. Anyway the only reason the review was written was to pay for the CompuCar itself, and by stretching this review out long enough we can up the word count enough to get some decent money.

The CompuCar is not really a car but instead a special computer that fits inside your car in a sort of cooperative symbiosis. For the test we had it installed in a member of the staff's Volkswagen Microbus (circa 1968) which had already been slightly modified to accomodate the engine from a Porsche Turbo. We felt that the microbus would allow for the cleanest installation since it had enough room for the fully expanded version of the CompuCar. It was felt that the small underdash units do not offer any real capability and are just toys no better than a video game.

Installation

Installation took every weekend of two months but as you can easily see it was worth every minute of it. The CompuCar takes up most of the interior of the microbus (see Photo 1) and looks a little disorganized but in fact this is just the external corporal representation of its virtual and metaphysical internal hyperintensive structure. A rack mount version is available for those small minds to whom the aesthetics of externalities are important, but purists will favor the more straightforward installation.

In our particular case, we felt that securing the hardware was of utmost importance. Our initial failure to do so resulted in a minor problem in one jackrabbit start when the insufficiently secured CompuCar hardware created a new opening in the rear of the vehicle. Ensuing damage to the hardware itself was suprisingly minimal, but repair to the Volkswagen and the truck behind us cost $7,000.

Controls and Operation

Although the mainframe of the CompuCar is located in back of the car (Photo 2) an operator's console for command entry and readouts is mounted in the passenger's seat (Photo 3). This console allows instant readout of certain critical information (miles per hour, thickness of tire tread, last time car was washed, proximity to active geological faults, etc.) The keyboard allows instant programming of the CompuCar in pseudostructured hexadecimal form, and the joysticks provide for a very human-engineered means of controlling analog factors. It is even possible to remove the traditional old-fashioned mechanical controls (such as steering wheel, brakes, etc.) and allow the CompuCar to use its modern electronic brain to control these various low-level driving functions. Imagine the looks you'll get from State Troopers when you cruise past at 180 mph, fast asleep in the driver's seat of a Volkswagen Microbus. We did note some problems with the CompuCar driven in automatic mode as the program seems to bomb when the car is exactly midway between two active geological faults, suspending all automatic control functions. Helpful maps are available from the U.S. Geodetic Survey; plan your trips carefully.

Conclusion

The reviewers found that their lives were immeasurably improved by the CompuCar (at least 80 decibels) and would urge every one of you to buy one. Send your orders ($300 plus $5.95 s/h) to Horrendous Hardware, c/o DKBCPPRMCDIWJ, PO Box 789-M, Morristown NJ who are not really making them but your order will be expedited and passed along to the other Horrendous Hardware Company. Cash only, please. Allow 12-16 weeks for delivery.

Photo 1. Compucar makes efficient use of the available space.

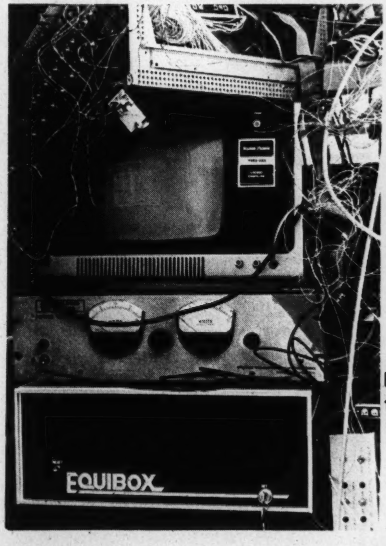

Photo 2. Mainframe of the unit fits neatly in the back of the vehicle.

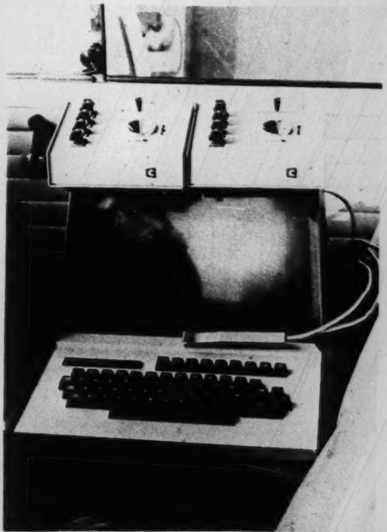

Photo 3. Operator's console is mounted in the passenger seat.

Meal Preparation Robot

by Htaed Tnatsni

The robotics division of Horrendous Hardware in cooperation with Scandalous Software recently introduced the third in a series of household robots. Here at DKBCPPRMCDIWJ we were fortunate to obtain a preproduction sample of the Model MPR meal preparation robot.

The programming and communication protocols are compatible with earlier Horrendous Hardware (HH) robots, thus we were able to use our Robot Rover (Model ARF) with the newer MPR model.

We installed the MPR Robot in the house of a (former) staffer and powered it up. The MPR Robot has soft plastic wheels, not unlike those found on Speedster skateboards, thus it will not mar hardwood floors. Following our verbal commands, MPR rolled into the kitchen. We showed MPR the cupboards, range, refrigerator and other storage areas. Having been preprogrammed to recognize various foods, utensils, pots, pans, dishes and other kitchen tools, MPR was quickly "at home" and flashed a message to us on its 40-character LED communications screen saying, "I WILL NOW TAKE OVER." The directness of this message was somewhat alarming, but we were confident that the programming at Scandalous Software was beyond reproach, hence we left MPR alone to its chores.

The lucky staffer who received MPR was told only that the latest model food preparation robot had been installed at his home to prepare meals for a week or so. We did not wish to bias him by telling him that MPR was a prototype robot; otherwise he might not have put his full trust in the robot which would not lead to an honest account of the robot's performance.

* * * * *

This is the portion of the article reserved for the critical review by our (late) staffer.

* * * * *

Our (recently departed) staffer did not report to work the next morning. We wrote this off to an infatuation with MPR or perhaps an overly rich meal which caused minor stomach cramps the next day.

After three (3) days of this errant behavior, our Publisher said, "Fire the bum!" We went to his home to investigate and there found MPR standing in the doorway with the following message on its LED screen, "NO MEALS EATEN FOR 2.67 DAYS." Further investigation revealed four corpses, all with grimaces on their faces. We speedily had MPR bury them in the backyard (assisted by Robot Rover) and then shut off MPR and shipped him back to the Horrendous Hardware factory with a letter encouraging them to "try him out in your company cafeteria."

```
17:10:00 * INTERRUPT *  Begin dinner preparation program
17:10:01 Select menu of nutritious foods that will be eaten by
         75% of the family members 75% of the time
17:10:04 * ENTER MENU SELECTION ROUTINE *
         Ground Beef * ACCEPT * FOOD=1
         Catsup  * ACCEPT * FOOD=2
         French Fried Potatoes  * ACCEPT * FOOD=3
         Vegetable Oil (to fry potatoes)  * ACCEPT * FOOD=4
         Spinach  * REJECT * Does not meet 75% criterion
         Green Beans  *REJECT *
         Brussels Sprouts  * REJECT *
         Lima Beans  * REJECT *
         Carrots  * REJECT *
         Seaweed Kelp  * REJECT *  None available in 50-mile
         radius
         Dandelion Stalks  * EVALUATE *  Meet nutrition
         requirement.  Not served to family previously.  No
         taste data available.  * ACCEPT *  FOOD=5
         Milk  * ACCEPT * FOOD=6
         Ice Cream  * ACCEPT *  FOOD=7
         Chocolate Sauce  * ACCEPT *  FOOD=8
17:10:30 * ENTER FOOD SEARCH ROUTINE *
              Find FOODS 2, 3, 6
              Cannot find FOODS 1, 4, 5, 7, 8
17:10:52 * ENTER FOOD GATHERING ROUTINE *
         Send robot rover to front yard to acquire 0.32 kilo
         FOOD 5
17:11:00 * ENTER SUBSTITUTE FOOD ROUTINE *
         Search for match on (1) Texture  (2) Appearance,
         including color, size, shape
17:11:09 Find match on FOOD 1
              Container label : Gainesburgers
17:11:24 Find match on FOOD 4
              Container label : Lestoil
17:12:07 No further matches found
17:12:08 * ENTER MAKE SUBSTITUTE FOOD ROUTINE *
17:12:09 Making FOOD 7
              4 ice cubes, 3 gm each
              0.5 cup cream
              Blend in food processor 3.2 min
              Put in freezer
17:15:40 Making FOOD 8
              10 oz can black shoe polish
              melt at 98c for 7.45 min
17:17:10 Detect foul odor.  Turn on exhaust fan
17:32:17 Robot rover returns with FOOD 5.  Also collected 3
         meadow muffins; will serve as special treat.
17:44:03 * ENTER COOK FOOD ROUTINE *
17:45:10 Fry FOOD 1 for 6.2 min per side
17:46:25 Simmer FOOD 5 in water for 14 min
17:53:04 Fry FOOD 3 in FOOD 4 for 5.4 min
17:59:01 * ENTER SERVE FOOD ROUTINE *
         Pour FOOD 6 in glasses
         Place FOODS 1, 3, 5 on plates
18:00:00 *** FAMILY SITS DOWN AT TABLE TO EAT ***
18:01:07 Detect hostility toward machines in conversation
18:02:05 Detect family not eating.  Conclude all will die of
         malnutrition unless action taken.
18:02:07 Strap arms and legs of family members to chairs.  Feed
         as babies including surprise muffins from Robot Rover
         and wonderful dessert FOODS 7, 8.
18:30:00 * ENTER CLEAN UP ROUTINE *
         Note all foods eaten.  Put plates and glasses in
         'Recycle/Disposal'
18:31:30 * DEACTIVATE UNTIL BREAKFAST PREPARATION *
```

Fig. 1. Printout of program run found in MPR upon investigation by (un-named) people from This Magazine.

Even at 5:12 a.m. it's hard to quit playing Impersonal Software strategy games.

A quick game before turning in can easily become a quick divorce or case of insanity when you load any of the Impersonal Software strategy games into your Lemon II, PIT, or Trash-80. They'll frustrate, annoy and hook you. And now there are new Impersonal Software packages to numb your mind:

Earth Trek is a new twist on an old game. Take command of a new tricycle in realtime action to make your neighborhood safe again. Peddle up and down the streets avoiding cars and Klingon dogs. Easy to learn, difficult to play, impossible to win.

Megachess requires an entire bank (32) of Trash-80s with one for each chess piece. Has one-ply look-behind algorithm. After each move, the computer announces "Why didn't I castle on my last move?" or "I wasn't expecting that!" or even "Can I take that back?" Upon finding itself in a losing position, the game provides nanolaughs as it makes your bishops into pawns.

YOU JERK
Michig

Sorry Partner. From the title you might think this is yet another shoot em up game where you have to draw a gun and shoot your opponent before he, she or it shoots you. It isn't. This game assists you in playing the board game, Sorry. Dice rolls are instantly analyzed and the computer will tell you in a jiffy if you qualified to move a piece out by rolling a two.

Hackgammon will give you hours of challenging fun staying up all night trying to finish a game. Many random skill levels. The idea is to find the hidden syntax errors. Play almost to the end of an advanced-level game before finally finding a new one. Written by Ernest Hemmingway for the 8K PIT and Lemon II.

Impersonal Software produces a high quality line of frustrating, abusive and insulting programs for recreation and personal applications. You won't stop playing until they carry you away. IS also produces the Invisible Calc program that hides all your calculations from you as well as the IRS, the Vitamin cereals series and other excruciating software for Lemon II, PIT and Trash-80.

Now that you've read all about them, you can hear about them too. Just call **(212)936-3838**

Why There Are No Programmers

by
Stephen Kimmel

I was teaching a class at the local junior college on computer programming when the great flaw of the assumed coming computer boom occurred to me. The problem seemed simple enough. If you are feeding fifty people and they eat an average of 55 square inches of pizza each, how many of each of three size pizzas would you have to buy? Simple?

Wrong. Nearly half of the class couldn't tell me how many square inches of pizza they had to buy. Without that ability, the rest of the exercise in programming was a waste of effort. And this was in a class of people who had an interest in programming!!!! How would I have done if I'd asked the general populace?

"Sir, if you had 50 people who each ate 55 square inches of pizza, how many square inches would you buy?"

"What you talking about, kid? Pizza's has round inches."

"Uhhh, madam..."

"Mugger!"

Clearly, there is something missing in the American educational system. And it clearly affects the lack of good available software.

I began to investigate this lack and my findings have proven truly astounding.

First, I have observed that there are virtually no programmers under the age of 15 or over 60. This of course doesn't mean that these individuals are incapable of programming. They simply have different interests and abilities. Immediately, you reduce the number of Americans who could be programmers from 210 million plus to approximately 130 million. Further, we obviously must eliminate the twelve and a half percent of Americans who are functionally illiterate. This reduces the number to 116, 623, 875. At first glance that would seem quite a large number of potential programmers. Further reductions, however, are required.

Only about 20% of all Americans have any algebra training. The value of this can hardly be questioned. Without the ability to solve the problem, or at least know how to approach a problem,the very idea of programming a computer to solve a problem seems ludicrous. This reduces our number of possible programmers to 23, 324, 775. Truly, this is evidence of the great failing of the American educational system.

A recent survey of a group of American chiropractors and veterinarians indicated that fully 60% answered "No opinion," "Don't Care," or "Republican." Clearly, these individuals not interested in programming can be eliminated. Thus our number of programmers is reduced to 9,329,910. This may, at first glance, seems a perfectly adequate number to handle all the programming needs of America well into the 1980's. But...

Computers are still a fairly expensive item to own. Even a minimal unit will cost more than a color television. It was clear to me that I would have to eliminate all those who couldn't afford a computer, would have no access to computers or who would prefer "I Love Lucy" reruns. I conservatively estimate that only a third of Americans can afford computers now. The number of programmers is, therefore, no more than 3,109,970. Of these, no more than 20% actually have a computer that they can spend time programming on. The number becomes 621, 994.

Despite the fine efforts of various publishers, programming training is still the best way to learn programming. Certainly, no more than 1% of Americans have actually had any computer programming training. If you've ever been in one of those classes, you'll realize that no more than one in twenty proves capable of surviving the lectures to be able to produce something more productive than a Playboy Bunny calendar. Further, as you recall from the classes you've attended in various subjects, you're lucky if you actually use more than one percent of what you were taught.

When all of these factors are taken into consideration, the cause of America's software crisis becomes clear.The only foreseeable solutions include mandatory algebra for all ages, mass distribution of computers to all Americans, required continuing education classes in programming for everyone, and a massive government propaganda effort to eliminate the "Don't cares." Until that time, America's two other programmers and myself are working just as fast as we can and you'll have to wait your turn in line.

Next Please?

Do You Have What it Takes to be a Computer Programmer?

Take this simple test and find out!!

1. What is your name?
2. Without looking, are you male or female?
3. Which of the following numbers is a 1?....1
4. Can you find your way through this maze?

IN OUT

5. What is the sum of 1 and 1? Be careful! There's a trick to this one!
6. What is your favorite color? Why not?

Scoring.

0-1 : Regrettably we can't all be computer programmers.

2-5 : You have the potential, with work, to become a professional class computer programmer. All you need is a little training

6 : You either cheated or you are already a computer programmer. Congratulations!

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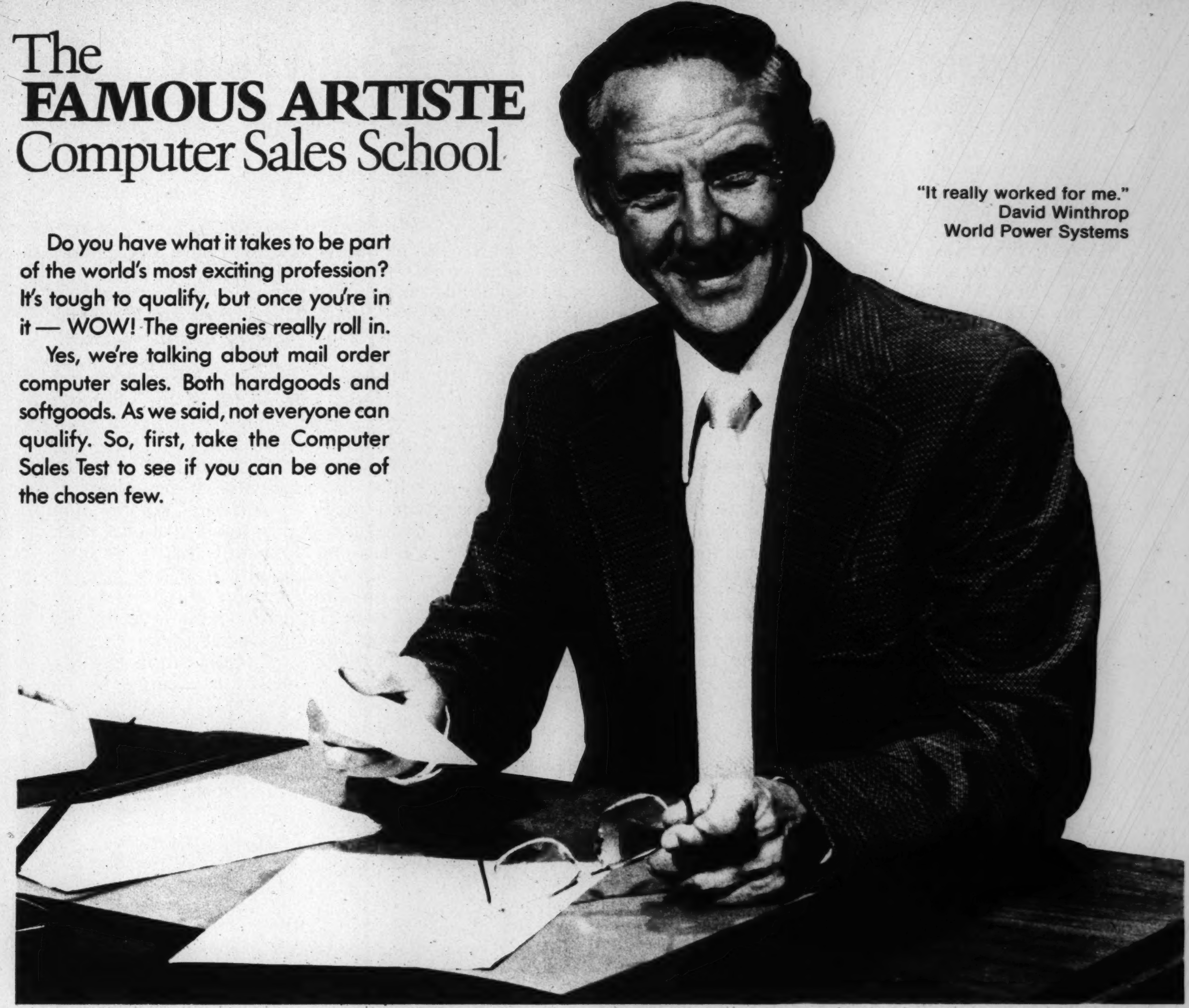
FAMOUS ARTISTE
Computer Sales School

Do you have what it takes to be part of the world's most exciting profession? It's tough to qualify, but once you're in it — WOW! The greenies really roll in.

Yes, we're talking about mail order computer sales. Both hardgoods and softgoods. As we said, not everyone can qualify. So, first, take the Computer Sales Test to see if you can be one of the chosen few.



"It really worked for me."
David Winthrop
World Power Systems

	Yes	No
1. Are you between the ages of 16 and 85?	☐	☐
2. Do you have a telephone or know where a pay phone is located?	☐	☐
3. Do you have a doubleknit or fluorescent necktie — preferably green or purple?	☐	☐
4. Are you either employed or unemployed currently?	☐	☐
5. Do you have a Master Charge card with any credit left on it?	☐	☐

Were you able to answer "Yes" to any of these high technology questions? If so, you have taken the first step towards the exciting world of mail order computer sales.

You, too, can receive our world-famous **Successful Computer Hardware Lucky Order Closing Kit** (SCHLOCK). As an authorized SCHLOCK'er you will receive absolutely everything you need to become an instant computer mail order millionaire:

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- 7 Teletype KSR 33's
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Right this very instant, fill out the coupon below with your payment so you, too, can become an instant millionaire.

TO: The
FAMOUS ARTISTE Computer Sales School
P.O. Box SCHLOCK, Del Rio, Texas

I passed your high technology test and wish to be considered as one of your SCHLOCK'ers. I am enclosing my down payment of $6,250.00.

☐ Check enclosed ☐ Cash enclosed
☐ Charge to my credit card shown below:

☐ VISA
☐ Master Charge
☐ Auto Club
☐ Social Security
☐ Texaco
☐ Sears
☐ Macy's
☐ Safeway

Card #________________________

Millionaire Name: ______________________________

Millionaire Address: ______________________________

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Build An Interface To The Real World

Yggip Ssim

Many faithful **Creative Computing** readers will remember the popular article of a few years back subtitled, "How to Dindle a Framistan." As might be expected, this generated much reader interest and many letters requesting a follow-up piece. Now, with so many articles in print on how to interface an electric blanket to a PET, or connect a washing machine to an Apple, it is difficult to know what would have widest reader interest and, at the same time, not have been previously published.

However, looking through our vast correspondence file (a large cardboard box into which, unfortunately a can of black walnut stain and a half a bottle of Gallo Rhine wine had been spilled), it became immediately apparent that the device most needed by readers was a general-purpose real world interface. Since we pride ourselves on not writing theoretical articles that cannot be replicated by the average TRS-80 owner, we selected a real device to illustrate this General-Purpose Real World Interface (GPRWI, or, using poetic license, a PIGWOR, which may or may not be any better. But if you don't have an acronym, you don't have a program.) The device we selected was an aeolipile.

Imagine the surprised expressions on the faces of your friends when in the middle of nowhere you whip out your brand new home brewed aeolipile/TRS-80 interface. Wow. After you've had this around your house just a few days, you will say, "How did I get along for such a long time without an aeolipile interface?"

The unfortunate thing is that just last week our gerbil, Gigo, ate our aeolipile. This was truly ungood, but further searching amongst the sticky mass of letters revealed that many readers are experiencing problems with their blast furnaces. (We found from bitter experience that most frequently the recipe is at fault. We now use 1.6 m tons of ore, 0.7 m tons of coke, 0.2 m tons of limestone and 3.6 m tons of air for each short ton of iron.) Hence, leaping upon this fragment of information, we decided to show you how easy it is to build a PIGWOR for transporting pig iron and wrought iron (you see the beauty of a well-designed acronym!).

Undoubtedly you currently transport your molten iron in a ladle. The average 6-ton ladle is moved about by a 50 hp electric winch controlled by levers and push buttons. It is this archaic arrangement that we are going to replace with a modern TRS-80.

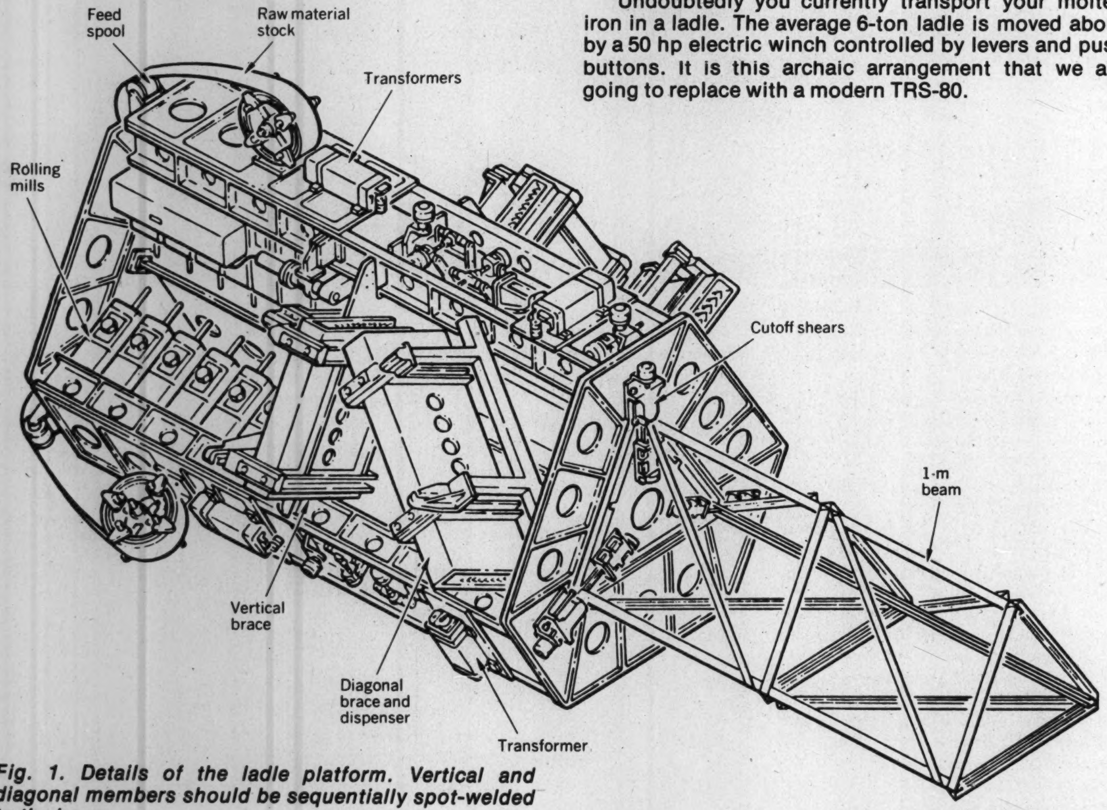
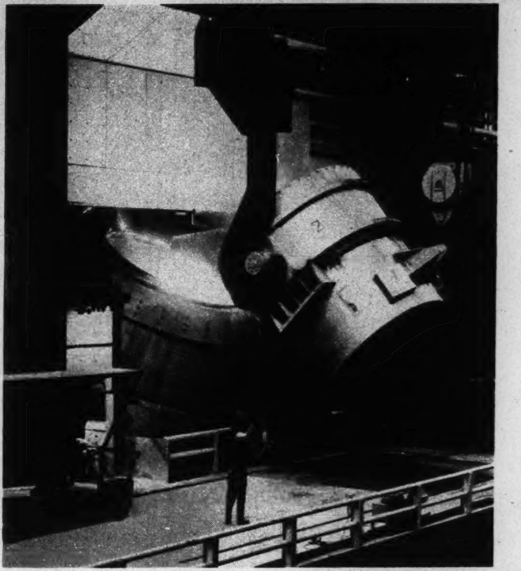


Fig. 1. Details of the ladle platform. Vertical and diagonal members should be sequentially spot-welded to the beam.



Typical home installation of 6-ton iron ladle.

Building the Ladle Platform

The ladle platform is simplicity itself. This is, of course, the device which travels along the traveller and holds the ladle with its mighty arm. (It's hard not to get goose pimples when thinking of ladle platforms. Gosh!) Since all existing ladle platforms are unsatisfactory for interfacing with the PIGWOR TRS-80 interface, you will have to construct a new one. The complete details are shown in Figure 1. Dimensions are not given since it will have to be scaled up for your installation. Take your measurements from the drawing with an accurate rule and scale appropriately. Construct using double or triple weight Erector Set parts and set aside.

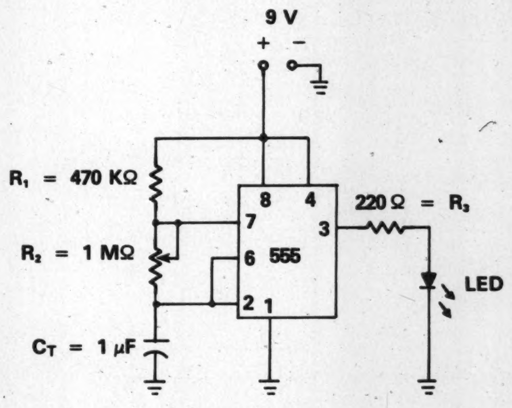


Fig. 2. Layout of PIGWOR Interface Circuit.

Building the PIGWOR Interface

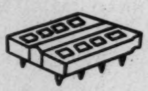
Before you start, keep in mind that you are building an electronic device of the highest precision. There is no room for the slightest error. The printed wiring board, small as it seems, provides a base on which to mount the components and the connectors from the TRS-80 and the ladle platform. Be sure to be extra special careful because the printed circuit board contains delicate semiconductor devices.

The following procedure will help you produce an interface for your every need, be it aeolipile or ladle platform. As you read each step, perform the necessary operation. Do not go on to the next step until you have finished the previous one, as your interface will probably blow up. Be careful.

( ) 1. Make sure you have the necessary parts. Use check list below.

( ) 555 IC

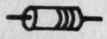
( ) 8 pin DIP socket



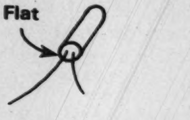
( ) 1 MQ pot (Does MQ really mean misquote?)

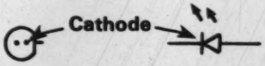
( ) 220 ohm resistor (OR-OR-BR or AND-AND-RB)

( ) 470K ohm resistor (YL-PR-YL)



( ) LED (available in old calculator, Altair computer, etc.)

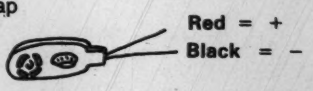




( ) Copper clad board -- approx. 1"x1"

( ) 1 uf capacitor

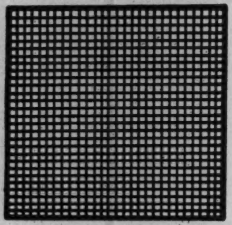
( ) Battery snap



( ) 9-volt battery (long life variety. You don't ever want to see this baby again.)

Interface, con't . . .

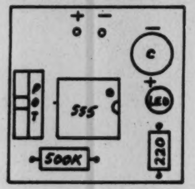
( ) 2. Design circuit layout using grid below. Place parts, mark off components and locate holes. This is the component side. If the holes line up with the foil (circuit) side, it would be even better. The circuit is shown in Figure 2.



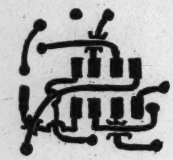
(Tape board to this layout and turn paper over to locate foil pads.)

( ) 3. On the foil side, draw conductors as shown below. Since this is an advanced project, tunnels and bridges have been used. You may use whatever method you wish to achieve this on the foil layout.

Component Side



Foil Side

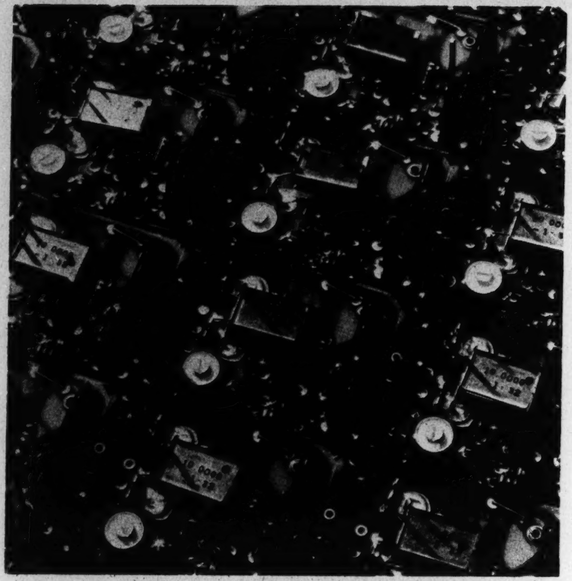


( ) 4. Etch, wash, reclaim, dry, remove resist and inspect board.

( ) 5. Mount components and solder in place.

( ) 6. Install completed circuit at Point 9 as shown in Figure 3. The photo shows the finished circuit in place.

( ) 7. Hook up to TRS-80 and ladle platform with at least 3-ton trial load of molten pig iron. If the circuit does not work, check for the following. If these are OK and the circuit still dumps molten ore on the floor, write (do not call) us for assistance.



Finished PIGWOR Interface installed at Point 9

( ) IC in wrong (tap with ball peen hammer to assure firm seating)

( ) LED in backwards (produces negative light -- hard to see)

( ) Solder bridges (like Brooklyn or GW, but for electrons)

( ) Faulty 555 chip (unscrupulous vendor sold you potato or cow variety instead of silicon)

You have just completed the process of fabricating a modern printed circuit board using a state-of-the-art semiconductor chip. Your PIGWOR should give you many faithful nanoseconds of service and hours of fun. If you want to know more about integrated circuits, be sure to subscribe to this magazine. Golly!

Next month: Programming the PIGWOR. □

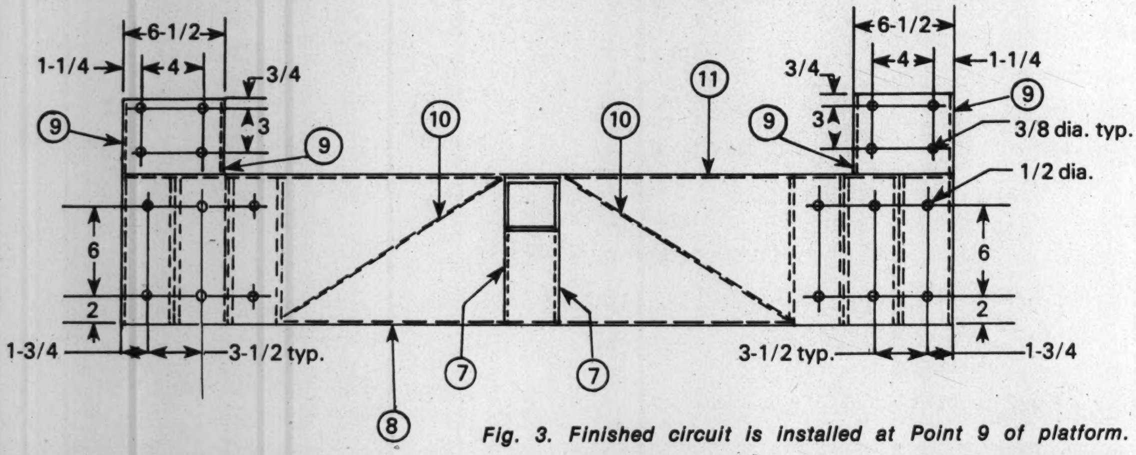
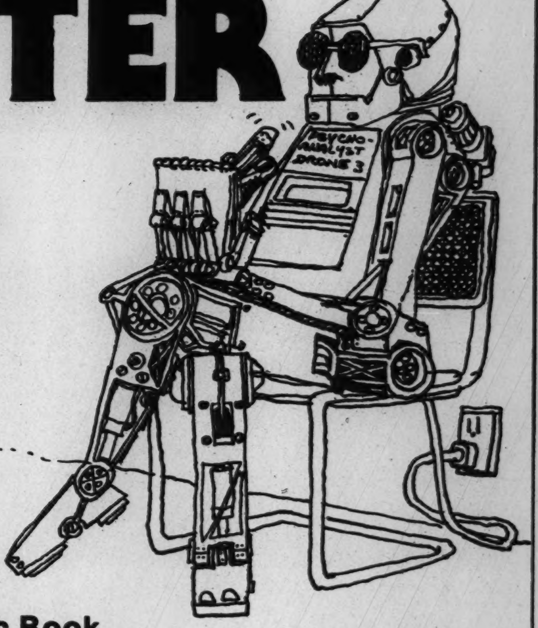


Fig. 3. Finished circuit is installed at Point 9 of platform.

MORE BASIC COMPUTER GAMES



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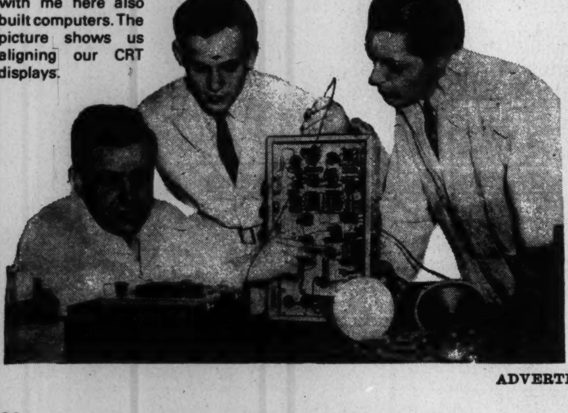
I built this computer and display and, Boy what a honey it is! I get wonderful output on it. Below, I tell you all about how I did it.

How I Built My Own Computer

by Llob Legan

Not very long ago, computers were a complete mystery to me. But not only did I build a complete computer system — I had a lot of fun doing it. And I've learned so much in a practical way that I'm well on the road to becoming an expert. In a few years from now I'll be able to "write my own ticket."



The two students with me here also built computers. The picture shows us aligning our CRT displays.

I always had a yen to get into computers before they got into me. But I didn't know how to go about it — until I heard about the S.P.I.T. of N.J. I went there with my discharge papers and they did the rest. They showed me how the Veterans Administration using everybody's hard-earned tax dollars would pay up to $500 a year against my educational expenses under the G.I. Bill. This meant that I had to pay very little out of my own pocket, plus I could continue to collect on unemployment while going to school. It's a big break for veterans like myself — especially when you get subsistence allowances in addition. And if you're into welfare fraud, you can really make out like a bandit. Of course, all the students here aren't veterans but most have something going on the side.

What bothered me at first, was that my mathematics was kind of rusty. It had been some years since I had got out of grade school and high school was a real bummer. I soon found out that the school had brush-up courses in math and even had facilities for teaching computer math from the beginning to students who never had the advantage of a high school education and couldn't rip off a good TI calculator. I convinced them that I was sincere and enthusiastic and that I was technically inclined, and so I became a student. Then the fun began. You know, you just can't build a computer right off the reel. I built seven crystal radio sets

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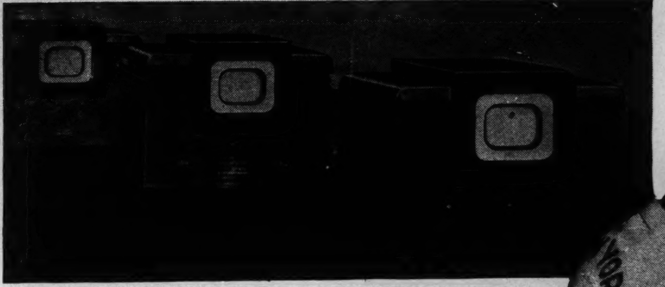
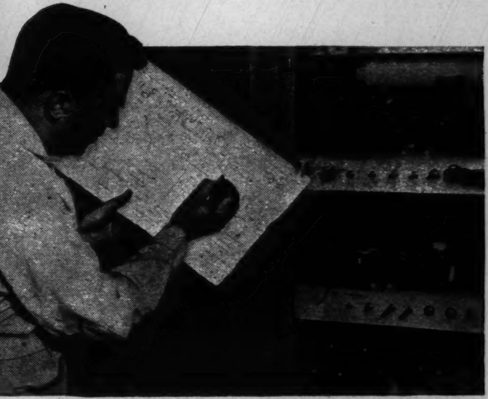


Here is a line of DuMont TV monitors that I and my fellow students use for comparative test purposes at S.P.I.T. of N.J. The very newest, latest equipment is ours to inspect and study at the school.



I want to learn about computer maintenance too. Here is a computer being maintained. I hope to enroll in a special evening class on maintenance.

and had to go through a total of 75 practical electronical experiments before they would even let me start on a computer.

Then I began work in earnest building my own 370/165. The instructors around here have plenty on the ball, and it was amazing how fast I progressed. I can't go into all the details here, but I turned the swell computer you see in the photo. I look mighty proud of myself, don't I? I guess I am.

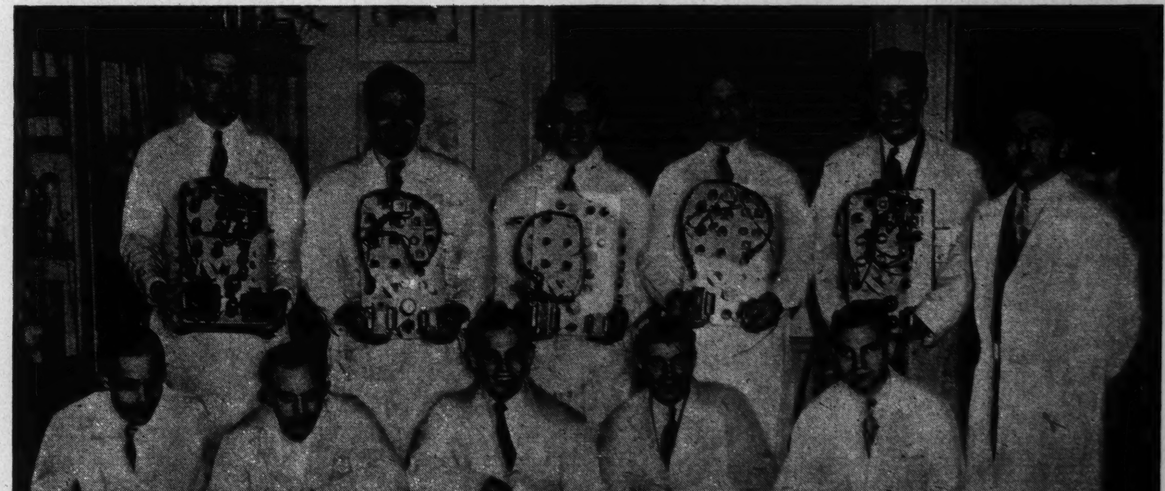
Boy, school was never like this. You should see the magnificent equipment. Finest in the world! There's a swell gang here — all interested in learning — all computer bugs. They come from all over because practical computer schools are hard to find and the S.P.I.T. of N.J. has a wonderful rep when it comes to computers. You should see the 8080 they have here at the school. Imagine a little hunk of silicon that costs $8.00! The school cooperates in every way — I don't believe that you can find better training anywhere.

Another thing I like about the S.P.I.T. of N.J. (which stands for the South Paterson Institute of Technology of New Jersey) is the convenient location. It's right in the *heart* of America's computer industry. It's close to everything. Big radio, television, electronics and computer manufacturers are nearby — like RCA, TDL, DuMont, and Edison. This means that the school is always in touch with the latest developments in electronics and computers.

The conditions here are really ideal. They have nanothousands of dollars worth of the latest types of equipment. I estimate that each student ruins $3,500 worth of experimental and test equipment. And there is a great deal of individual instruction. Classes are small and the instructors really know how to give you the business.

I am sure there are a lot of young fellows, particularly veterans and drifters, who want to get into this field. I understand there are about 120,000 openings for day students in classes beginning this June and July. If you want to get the complete dope about the school, you can have a free bulletin for just $2.00, which illustrates and describes its facilities and equipment; it also tells the classes that may be attended, housing conditions, costs, hours, etc. There is no charge except $2.00 handling for this bulletin. Send your letter to the South Paterson Institute of Technology of New Jersey, 158 Market Street, Bayonne, New Jersey.

These are my fellow class-mates (note that I am second from the left, standing) with the CPU chassis they built at the same time as I built my 370/165. I built the cabinet at home later on. Most of the classes are small, so you are sure of a lot of individual instruction, which is very important in learning the technical side of computers.



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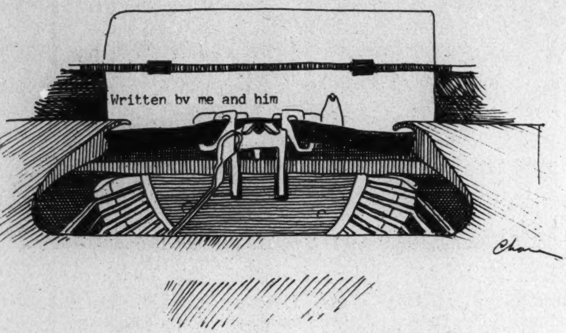
Affected Writing

Selpats Ysteb


Written bv me and him

How to Hide Your Basic Meaning

The computing community represents an audience that is radically different than the audiances that most people are used to writting for. Their are, therefore, a number of special considerations to be taken into account when writting for such a special group of people.

It is expected by people who have an intimate acquaintance with high technology that what they read will be of great significance . . . that it will generally require an important and intelligent person to successfully comprehend it. In order to make you're audiance feel important and intelligent, the writter must make himself seem important and intelligent.

At the same time — however — people who are into technology don't want to be hampered by a plethora of useless rules and conventions. The thing that you want to do then, is to make you're writting seem impressive without getting bogged down a web of unnecessary constraints. To get this affect can at times be quite a challenge.

Now that we know what you're objective is I want to give you some specific hints that will help you when writting . . . whether its a letter in ones job or a technical article for a magazine like this one or a remark for you're latest TRS-80 program.

Firstly, you should bear in mind at all times that we want to sound as erudite and educated as possible. Here are some watermarks of the kind of erudite prose that will make people realize that you are smarter than them.

As many descriptive words as possible should be used in your sentences when you are writting in order to allow you to become all the more specific with your meaning for you're intended audiance. It is also obvious and evident to even the most casual of observers that the more words you can pack into a sentence or paragraph, the more erudite you are because this serves to demonstrate that you are the possessor of an enormous and in all probability rapidly expanding vocabulary of words.

It has been learned through our research something that you will hopefully learn through this column and that is that pronouns are not nearly as important as once thought and if you simply use them in the manner which is most natural to you, your audiance will understand you. Us technologically oriented people, which is to say me and you, really have no need to pay alot of attention to the things which english teachers call "person and case." These are antiquated methods of distinguishing what roll a thing plays in the sentence. What is important is communication and nowadays I think we can leave pronoun conjugations to any of those english teachers brave enough to try and make young students learn them. Anyway, any english teacher will tell you that the english language is losing its reflections and in a few years from now noone will have to worry about them anyway.

And while I'm on the subject of pronouns, let's note one very important one which is now coming into it's own and gaining popularity among those of you who are reluctant to completely abandon case distinctions, but who nevertheless don't know how to correctly use them. What is referred to here is the so-called "reflexive pronouns." When faced with the delemma of deciding among "It was built by he and I" and "It was built by he and me," a convenient way to avoid the decision altogether is to say "It was built by he and myself." Another useful phrase is; "As for myself. . ."

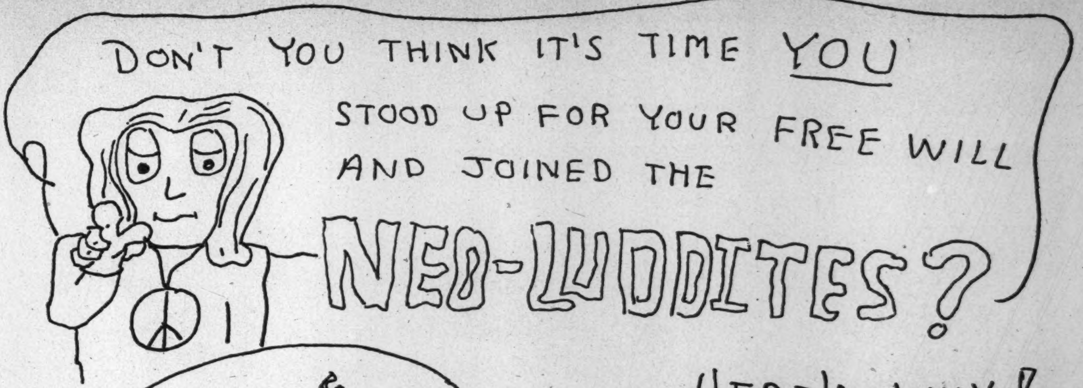
Now for another handy trick which will make both you and your writting and talking appear educated and inteligent, as well as desirably pedantic: Remember that anyone can use the simple past tense and it is — in fact — the first way that a child learns to refer to past happenings and occurances. The past perfect tense — however — requires much more education for proper mastery and is — therefore — the mark of the educated and intelligent person you are writing as. So whenever possible, the past perfect tense should be substituted for the simple past tense. For example rather than the pedestrian "When I crossed the wires, you were not looking," try the erudite "When I had crossed the wires, you were not looking," or the even more erudite "When I had crossed the wires, you had not been looking." (But after they had been crossed, you had looked quite startled).

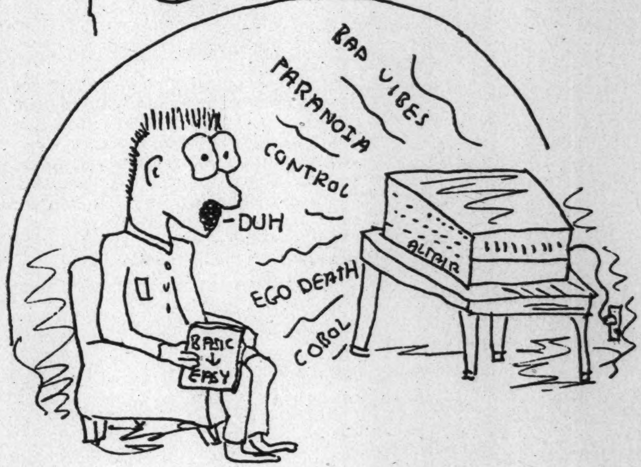
The invention of new words has always been the stamp of those on the cutting edge of a trial balloon. Us computer folks are in the best position in centuries to constantly invent new words. It won't be long before the general populace adapts them for they're own use, but you can always have the satisfaction of knowing, for example, that the use of the word "baud" as a verb was perpetrated by you. And that is the way to do it, to, just think of a word, and determine a way, that it can be used, as a different part of speech. Color and interest are also added to you're writting in this way.

As you may or may not have noticed by now, one of the things that adds an extra element of credibility to this column your reading now is the continued and repeated use of the passive voice. The passive voice is used to help you avoid making any statements for which you might later be held responsible. Rather than saying, for example, "I think," try "It is believed." You do not have to say who it is believed by.

In conclusion, let me finally reiterate once again that last but not least, what is said is not nearly so important as the way you say it. Communication is afterall the key and if the means to express your thought is not available in the structure and framework of the english language as you learned it — improvise!

This column has been written by Selpats Ysteb for Evad Lha who only edited it.


DON'T YOU THINK IT'S TIME YOU STOOD UP FOR YOUR FREE WILL AND JOINED THE NEO-LUDDITES?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-DUH
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↓
EASY

HERE'S WHY!

Computers make people sick!!! They enslave you and sap ALL your Creative Energy!! Computers hook you like dope! Programming is obviously a "VAST WASTELAND" This is common knowledge. Using hobby computers will cause you unhappiness in life and you're more than likely to get CANCER!!!

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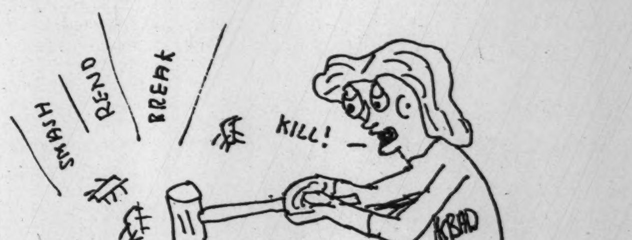
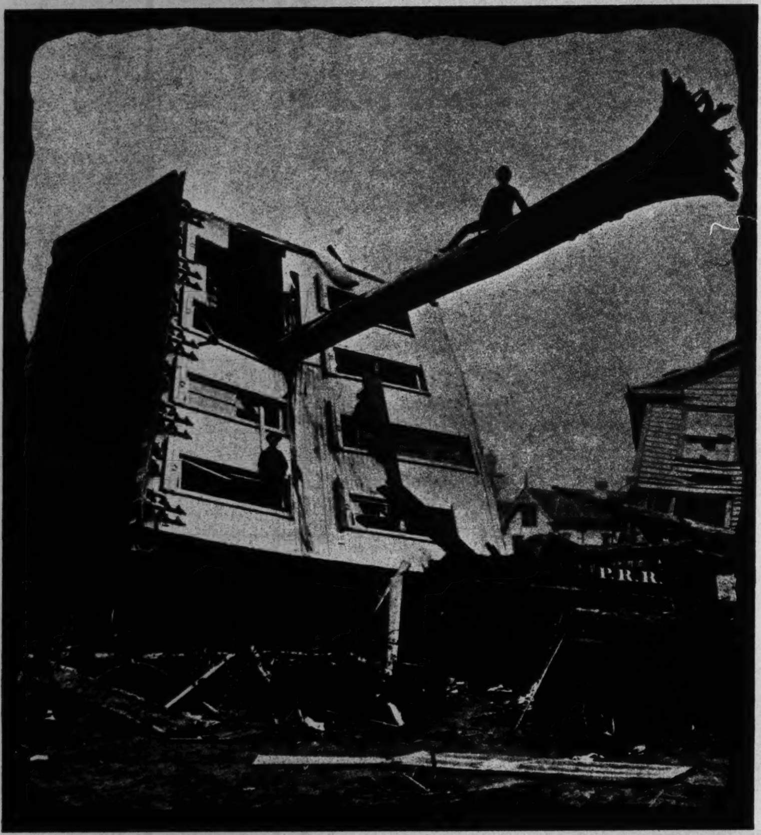

SMASH
REND
BREAK
KILL!
KBAD
ALTAIR

et cetera et cetera et cetera



Your Editors and faithful Staffers recently moved into a new building in (what was) downtown Morristown. Unfortunately, the Passaic River (20 miles to the east) and the Delaware River (50 miles to the west) decided to get together after the winter thaw and they chose Morristown as the site for their merger. Here is our lavish new headquarters just three days after moving in.

* * *

New HP-85 computer designed for personal or laboratory use. Here an investment analysis technician, following the instructions on the high-resolution CRT display which she activated with the typewriter-like 20-key numeric keypad, mixes a batch of "instant computer." Upon drinking it and eating 1.2 feet of thermal printer paper, s/he will become at one with the computer and will be able to communicate with it at the interactive bipolar CMOS level.

* * *

Our Face is Red Dept.

In the article "Control Your House," IC 4 was drawn inverted on the schematic diagram. This allows full line voltage to be applied to the computer A-to-D output port. In the TRS-80 this will burn out 38 IC's and in the Apple, 26 IC's. In computers with metallic cases, electrocution of the user is a likely outcome. We apologize for any inconvenience this error may have created.

After removing program bugs from live programs, we store them in the basement prior to dumping them at the Kim Buc (un)sanitary landfill for toxic wastes. However, after the flood many of the bugs turned into worms and infested our quarters. Staffers were obliged to wear C-clamps on their noses and be fitted with WW II charcoal gas mask filters in their throats in order to work around the incredible stench.

* * *

As a result of the absolutely terrible flood which devastated our offices, we misplaced some of the captions from the photos with which they belong. We know that one of the following five captions belongs with this photo, but we don't know which one. All seem appropriate. You may choose the one you like best.

"You mean I'm going to have to learn programming? Can I meet you after work?"

"You mean I've been working for the last five hours and the terminal was off line? Can I meet you after work?"

"You mean I'm **not** allowed to play Super Invader during my coffee break? Can I meet you after work?"

"The only reason I was running off checks for $9,999,999.99 was that I wanted to see how many digits it could handle. Can I meet you after work?"

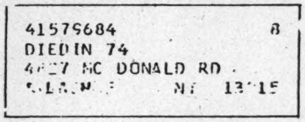
"I think my finger is stuck. Can I meet you after work?"

Still a Few Bugs in the System

An estimable magazine sent out a renewal offer not long ago to a subscriber who had not renewed. The label was returned with a line through the gentlemen's name and a handwritten notation, "Died in '74."

You guessed it—the correction was made.

The next mailing, identical to the first, went out addressed as follows:



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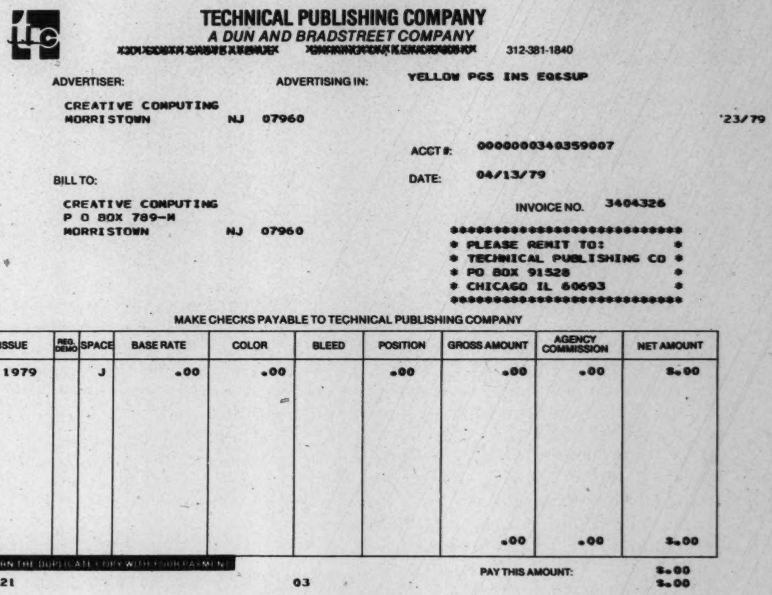
4[illegible]7 MC DONALD RD
[illegible] NY 13[illegible]15

Forbes, Dec. 11, 1978

In March 1979, we placed an advertisement in an instrumentation magazine published by Technical Publishing Company, a subsidiary of Dun & Bradstreet. **Datamation** magazine is owned by Technical Publishing Co. also.

For the next three months, we received statements dunning us for $0.00 asking for prompt payment. The April notice is reproduced at the right.

Then in October, Mrs. C. Computing received a fantastic opportunity to participate in a $50,000 Sweepstakes sponsored by Spencer Gifts. We declined to use a perfectly good 15¢ stamp to enter.



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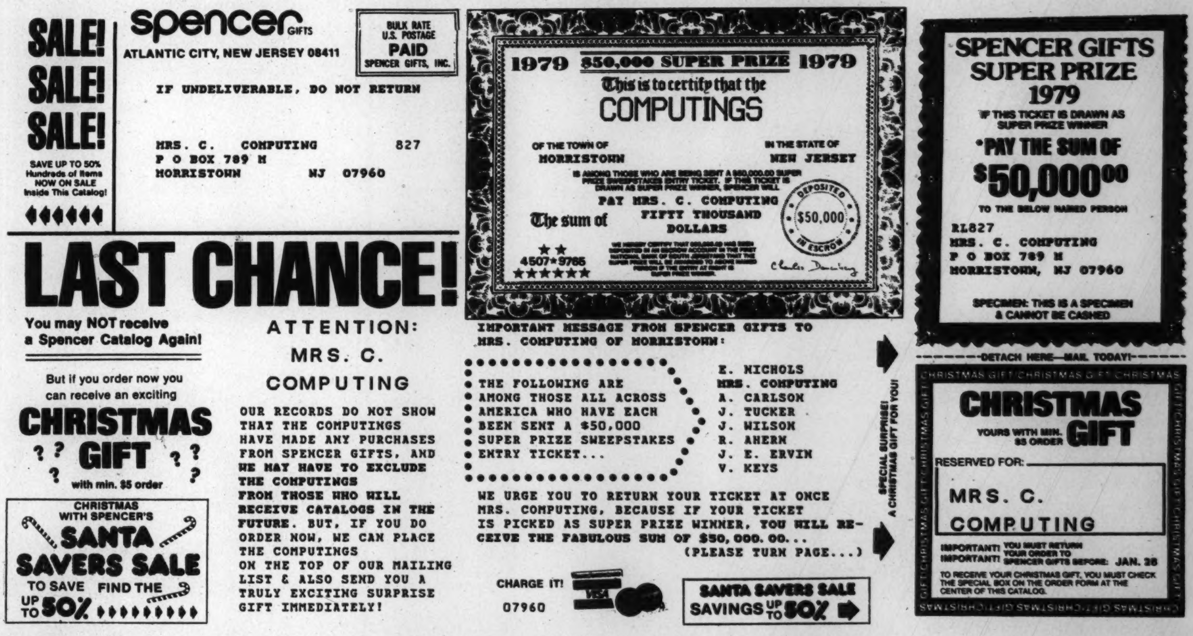
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creative computing
EQUIPMENT PROFILE

Smith Sisters Wonder Which

Ysteb Selpats

The Electronic Wonder Which from Smith Sisters, Inc. is the ultimate in electronic non-games. For those non-parents who have not been keeping up with such things, it should be noted that electronic games have replaced the transistor radios of the early sixties as the ubiquitous entertainment status symbol among students in American schools.

It is not difficult to see why this is so. Perhaps the most attractive and endearing quality of these games and toys is their price. Possession of a toy that costs $35 to $50 identifies the owner as the child of wealthy parents and confers instant status. But there are certainly other considerations.

Electronics and computers are the wave of the future, and electronic games and toys put this amazing technology in the hands of youngsters where flashing lights and irritating beeps continually affirm its mystery and challenge. The child can take on all comers — other children, adults or the computer itself — and display his or her quick reflexes and well-developed eye-hand coordination. The toy responds immediately with positive feedback: lights flash and noises issue forth from its innards.

But what about the child who lacks eye-hand coordination, whose reflexes are slow, whose toy makes only nasty "raspberry" sounds in response to his or her efforts? What will happen to this child's psyche?

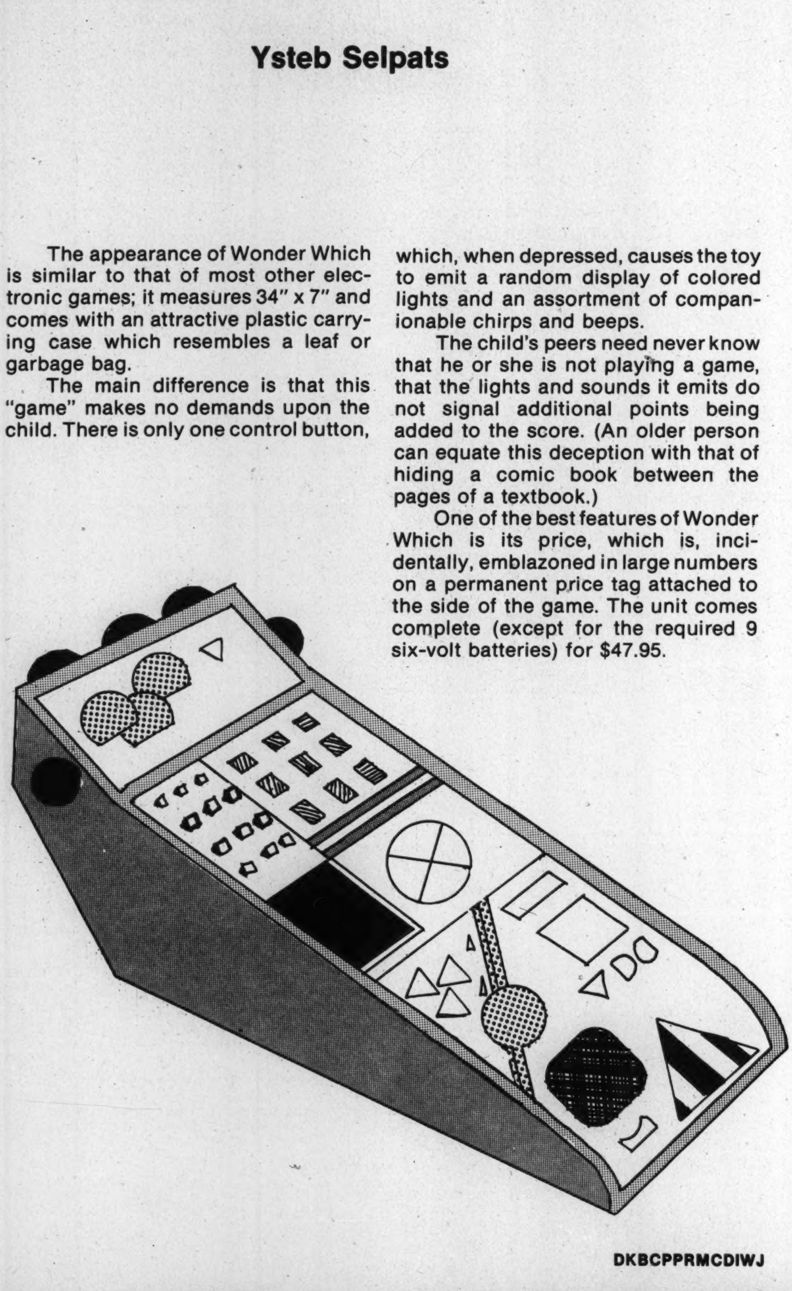
The Smith Sisters have provided the answer to this problem with Wonder Which. Wonder Which is designed specifically for the uncoordinated, not so bright, or just plain lazy, but nevertheless status conscious child.

The appearance of Wonder Which is similar to that of most other electronic games; it measures 34" x 7" and comes with an attractive plastic carrying case which resembles a leaf or garbage bag.

The main difference is that this "game" makes no demands upon the child. There is only one control button, which, when depressed, causes the toy to emit a random display of colored lights and an assortment of companionable chirps and beeps.

The child's peers need never know that he or she is not playing a game, that the lights and sounds it emits do not signal additional points being added to the score. (An older person can equate this deception with that of hiding a comic book between the pages of a textbook.)

One of the best features of Wonder Which is its price, which is, incidentally, emblazoned in large numbers on a permanent price tag attached to the side of the game. The unit comes complete (except for the required 9 six-volt batteries) for $47.95.



Kcivon L. Dlorah

Software Illegality Forum

Well spacey flight fans, the day we have all awaited is near. You may never need to rip off another program. No more sleepless, guilt-ridden nights. Those software barons are about to be put in their place.

This advocator has received news of a new organization and two, count them: "one" and "two," courtly decisions. The new organization calling itself Really Into Programs Obtained For Free (RIPOFF), has decided to mount a nationwide campaign of attrition against the software barons as a result of suggestions made by the pearls-of-wisdom givers in the new cases. Anyone interested in finding out more about this organization should contact Dr. Winthrop c/o Leavenworth Federal Institution, Leavenworth, Kansas.

The second case, MBI v. Commissioner was decided by the Court in April, 1980. Adopting the dictionary definition of algorithm and recognizing the validity of the claims by the hardware barons, such as MBI, that if computer programs could be patented, then their widespread use would be greatly reduced and thus prevent the using public from exercising their constitutional right to have something to feed to their hardware, and recognizing that science, mathematics and algorithms are the tools of creativity and should not be restricted, and also realizing that the algorithm could be done by hand with a pencil and paper anyway, the Court said, in its ultimate wisdom, after spending many agonizing hours with the case, and in a truly landmark decision (or should it be "LANDMARK"), at page 0010 1001 of 1111 1110 Feb. 4th, that computer programs may not be patented because they positively are not patentable subject matter under the Constitution (Article 1, Section 8, Clause 8), unless Congress passes a law to the contrary. And we know that Congress cannot pass any law let alone a law to the contrary.

The first case, building on the CompuChess case (see past issues of **Creative Computing**, said that since no one could figure out an object program stored in a ROM, and from testimony heard by the court that after a source program had been written, even the writer couldn't figure it out, a computer program can not be copyrighted, probably because it was unintelligible to anyone except a machine and clearly, a machine cannot read a writing in the literary sense. This was clear to the court.

The Really organization, in a letter to this writer, said that with increased access to the courts and the ability of Really to handle their own cases without legal fees because of their extensive experience in the courts, they were filing a law suit against every software baron who refused to give them unlimited reproduction rights for free on the basis that the barons were establishing an illegal monopoly. They figure that their legal fees alone would put the barons out of business and thereby free up all of their software.

Just think, software fans, soon we should have all the software we can possibly use. In the meantime, just ignore those comments by the software barons regarding the users eating Roasted Golden Goose as being so much sour grapes.

Next month, if there is still something to write about and there is still enough material for this magazine to publish, we'll be back. □

Kcivon L. Dlorah, Patent Attorney,
LARSON, TAYLOR AND HINDS,
Arlington, VA 22202

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apple is now selling PET

GOSSIP from the desk of FLOPPY DICK

LOS ANGELES — Rumors around California have it that Apple TV and Computing at 2606 South Robertson Blvd. is now recommending the CBM Computer. Several small business owners here have expressed their satisfaction after trying the CBM.

It seems that some of the features that they like are things like overall system flexibility, large (340K) floppy disk storage capacity, quality integrated CRT, large standard keyboard, not to mention upper and lower case.

Before the recent addition of the Commodore line, Apple TV and Computing sold the leading personal computer which bears its namesake. Recently, the owner of Apple TV and Computing, Dick Stroik, was quoted saying "previously, many of my business clients were impressed when they saw items like their monthly gross sales graphed in color on the screen. But now, they are giving their personal computers to their kids and ordering CBM computer systems for their businesses."

Dick is also pleased with the dependability of the CBM since he also services them. The $695.00 80-column printer is also a fast seller.

Rumors also have it that Comet Computers of West Covina, California is making a move to buy out Apple T and C, with the intention of changing that fruity name. I think Dick just might go along with that!

Thanks to:

Comet Computer
1337 W. Garvey No.
West Covina, CA 91790
(213) 962-7051

Richard Stroik
(213) 559-4268

CIRCLE 109 ON
READER SERVICE CARD

Floppy Disk Maintenance A Simplified Visual Approach

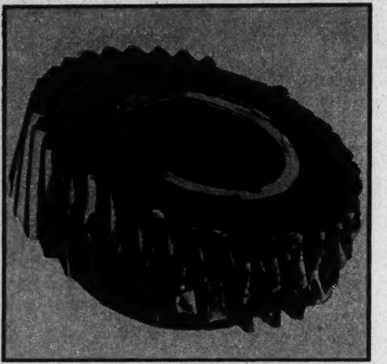
Toidi Egalliv

Do you get a mite frustrated when, after hours of entering text with Electric Pen, you type in the SAVE command only to get the message BAD SECTOR ERROR ON DRIVE A or ***BDOS READ ERROR. It's even more frustrating when the disk drive has erased your old file but not written the new one. And it really gets up the dander when you realize that you can't get out of the disk subsystem without restarting the entire computer system thereby destroying your hours of text entry.

The very system upon which this article is being written almost found itself in the trash heap when a part-time employee (and college senior) had spent 12 hours entering a major term paper into the computer. Following our advice, he had been periodically saving the paper as he went along in case of a system crash. Two pages from the end he saved it and — SCRUNCH, SCRUNCH, SCRUNCH — the old file was erased perfectly but the new one was not written giving instead a message BDOS WRITE ERROR ON A. There was no escaping back to Electric Pen to save it on another disk. No, the disk drive has Struck Again and had us in its clutches. Our resident genius, Steve North, disassembled the disk via software on another system and found an earlier copy of the saved file which could, by black magic, be recovered. It was only this quick action that caused our hero to graduate on time and prevented the annihilation of this system.

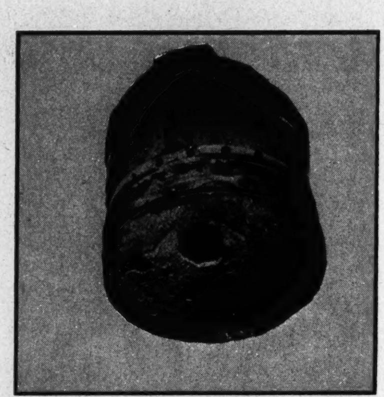
Since then we have paid a great deal more attention to preventive maintenance to nip these little disk glitches in the bud before they become ERRORS.

Since a picture is worth 1000 words or, assuming five letter words, a picture is worth 5000 bytes more or less, we opted for pictures instead of bytes. If you find these symptoms in your disk drives, act right away. In some of these cases the evil condition has progressed somewhat further than a prudent owner might wish.

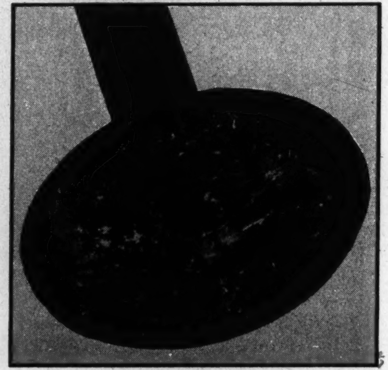


Drive gear (full size). Very careful observation will reveal several broken teeth (32, to be exact. To see all 32 we cheated — we have the gear here and can look at the entire circumference.) A fully broken tooth will cause the disk to stop rotating. This is ungood. The head will continue to seek (or write as the case may be) and will soon wear out the disk in that area. Solution: use a better gear lubricant. We recommend ½ quart of Mobil 1 in any new disk drive before you even turn it on the first time.

Drive shaft (full size). This part has not failed yet, but it will sometime within the next 12 nanoseconds of operation. Can you tell why? (Answer next issue.) If your shaft looks like this, DO NOT operate it for more than 100 picoseconds. Don't say we didn't tell you!

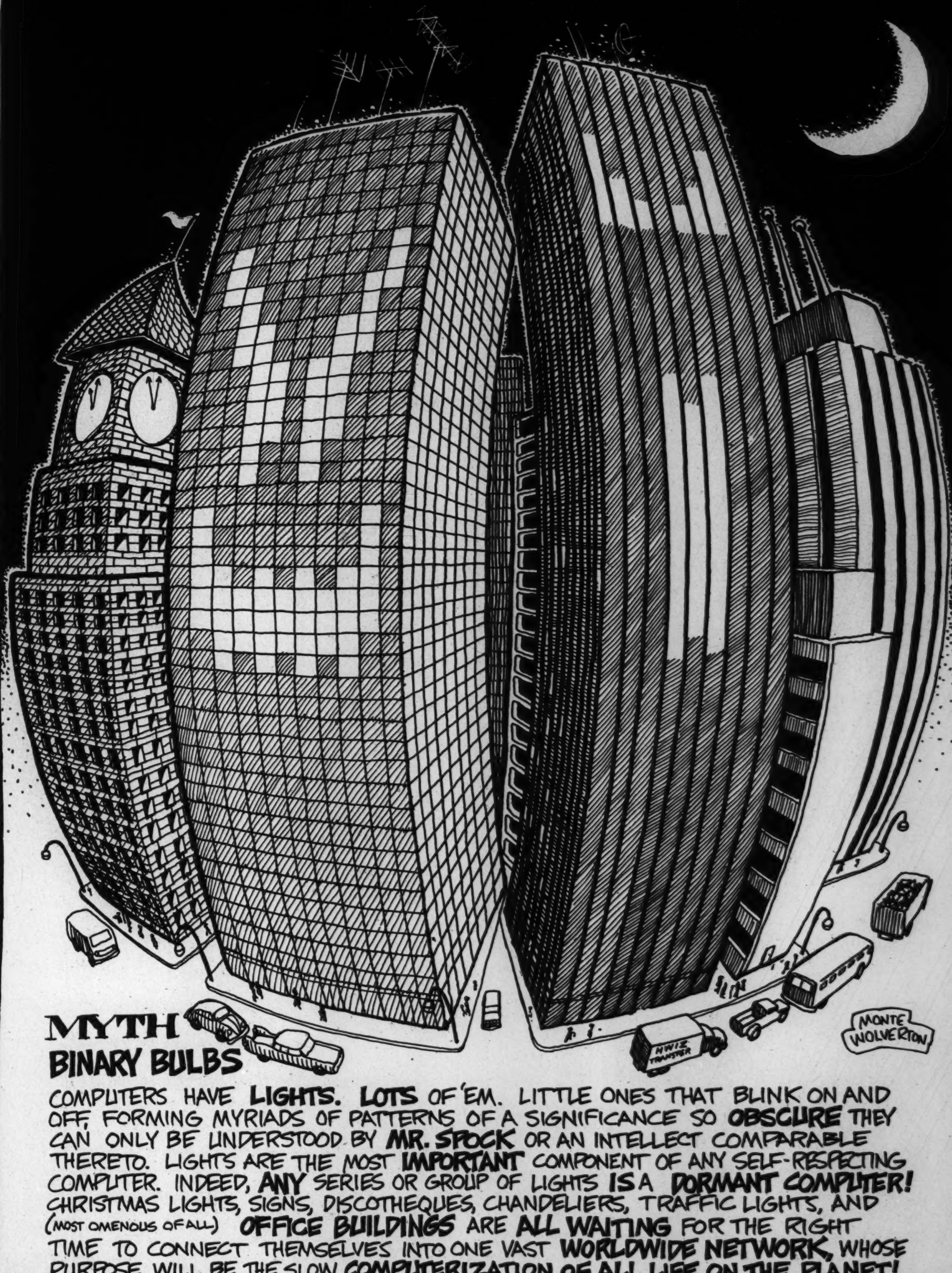


Write head (10,000X magnification). Notice the hole. This is where the bits flow out of the head and onto the disk surface. However, the hole is worn and uneven from too many bits flowing too quickly (or possibly from being sucked up too quickly when reading). Solution: slow down your data flow; your data are too long-winded.



Frammistan (156X magnification). In both shape and color this part resembles a miniature pizza, so it's easy to find even though it's so small. Like one's tonsils, no one is quite sure of the purpose of the frammistan. But if a slice has been removed, even a small one as in this photo, the frammistan can cause major errors in byte flow. Solution: feed the head regularly so it doesn't take bytes (or even bits) out of the frammistan.

COMPUTER MYTHS EXPLAINED



MYTH
BINARY BULBS

COMPUTERS HAVE **LIGHTS. LOTS** OF 'EM. LITTLE ONES THAT BLINK ON AND OFF, FORMING MYRIADS OF PATTERNS OF A SIGNIFICANCE SO **OBSCURE** THEY CAN ONLY BE UNDERSTOOD BY **MR. SPOCK** OR AN INTELLECT COMPARABLE THERETO. LIGHTS ARE THE MOST **IMPORTANT** COMPONENT OF ANY SELF-RESPECTING COMPUTER. INDEED, **ANY** SERIES OR GROUP OF LIGHTS **IS** A **DORMANT COMPUTER!** CHRISTMAS LIGHTS, SIGNS, DISCOTHEQUES, CHANDELIERS, TRAFFIC LIGHTS, AND (MOST OMENOUS OF ALL) **OFFICE BUILDINGS** ARE **ALL WAITING** FOR THE RIGHT TIME TO CONNECT THEMSELVES INTO ONE VAST **WORLDWIDE NETWORK,** WHOSE PURPOSE WILL BE THE SLOW **COMPUTERIZATION OF ALL LIFE ON THE PLANET!**

puzzles & problems

Relativistic Dodecahedron

Take a regular dodecahedron (a solid which has 12 sides) made of cardboard and flatten it out onto a plane by cutting or bending any edges you want so that it is as long as possible in one dimension. Assume that each edge is one light-year in length and that you have a spaceship that can travel .99998 the speed of light. Assuming relativistic effects, what is the observed time from one end to the inside of the space ship?

◆

A Place for N

Nilrem's pet cockroach Cornelius came up with this stumper. Neither Nilrem nor any of our editors could solve it. (Not even Harl Chelmers, but he had just discovered an exciting new language called SNOBOL and was working on a special issue.) The letters A-M are arranged thusly:

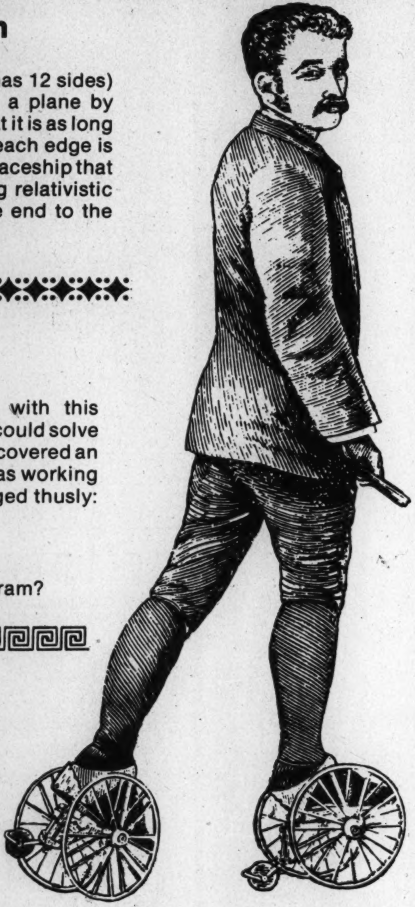
```
AB D     I K M
--------------
  C EFGH J L
```

Where is the letter N placed on the diagram?

◆

One Equals Twenty

This is always fun at parties. Take an old dollar bill and cut it up into little pieces with scissors. Put them all inside an empty paper bag and shake it up. Then reach inside the bag and pull out a brand new twenty dollar bill! How is it done?



Nilrem

Answers:

Relativistic Dodecahedron: Halfway, the other half you're on the way back.

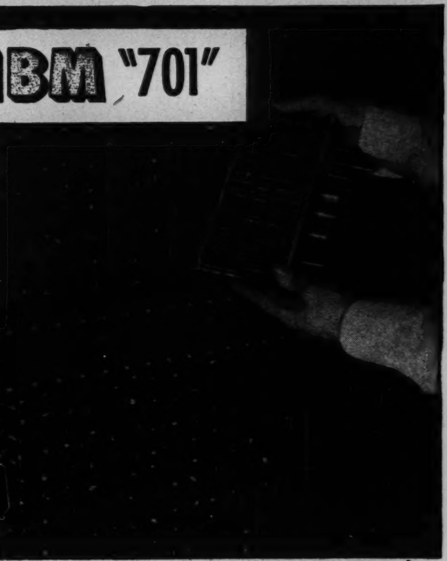
A Place for N: Either behind or in front of the line.

One Equals Twenty: Beats the hell out of Nilrem, but if you find an answer be sure to send it to him and he'll send you a copy of Nilrem's Puzzler Vol. 12, with more neat puzzles in it.

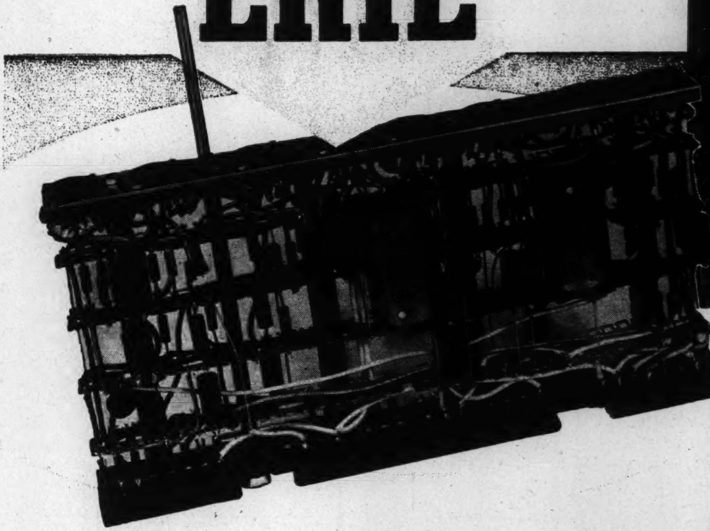
A "BRAIN CELL" for the IBM "701"

Electronic Calculator by

ERIE



One of the units being installed in the Analytical Control Unit. ↑



← **One of the 274 eight tube multiple pluggable units furnished completely wired and assembled by Erie for every "701".**

All the disc capacitors shown in this maze of back panel wiring are Erie Ceramicons. ↓

IBM's "701," designed to shatter the time barrier confronting technicians working on vital defense projects, is the latest development in electronic calculators. Its overall speed is 25 times that of its predecessor, the IBM Selective Sequence Electronic Calculator, popularly known as "the electronic brain." The "701," known as the IBM Electronic Data Processing Machines, consists of eleven compact and connected units. It performs in a few minutes calculations which would require seven years for a competent operator using desk model calculating machines.

The actual calculations are performed in the Electronic Analytical Control Unit. Erie assembles and wires 274 different eight tube multiple pluggable units similar to that shown above for every IBM "701." Erie also furnishes the four tube units used in the tape amplifiers. Erie Disc Filter Capacitors are used on inputs of all the DC service voltages supplied to the pluggable units, and all ceramic capacitors in the Power unit are Erie products.

For several years Erie has had in operation a department engaged exclusively in electronic subassemblies of this nature.

Write for further details.

25th Anniversary
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Another old game from DKBCPPRMCDIWJ....

Adventure in fORTRAN

by Willie Crowthers and Don Woods

Over the years, we have had many requests for listings of the original legendary Adventure program. In one particularly poignant episode, a high-level executive in charge of data processing at Xerox called pleading for a listing because their system had crashed, erasing an important part of their only copy. Apparently some of his own higher-ups were addicted to playing the game and this unfortunate soul felt that his job was on the line. It must be tough to be a corporate officer at Xerox, but when you have power then you use it for a while.

We present here the entire commented source listing of Adventure in fORTRAN and the necessary data files. The fORTRAN program can compile under the Tinysoft TRS-80 or CP/M fORTRAN compilers, but at least 156K of RAM will be needed in the link edit phase. Data files are given as direct ASCII dumps. To test the program once it has been successfully compiled, simulate the logic of the program as shown in the magazine for some typical inputs (like GO NORTH or TAKE KEYS) and see if your version does the same thing.

Next month: Weizenbaum's original ELIZA in IISP, and a small computer version of Smalltalk written in Level I bASIC (both on the same page, even.)

```
1       YOU ARE STANDING AT THE END OF A ROAD BEFORE A SMALL BRICK BUILDING.
1       AROUND YOU IS A FOREST.  A SMALL STREAM FLOWS OUT OF THE BUILDING AND
1       DOWN A GULLY.
2       YOU HAVE WALKED UP A HILL, STILL IN THE FOREST.  THE ROAD SLOPES BACK
2       DOWN THE OTHER SIDE OF THE HILL.  THERE IS A BUILDING IN THE DISTANCE.
3       YOU ARE INSIDE A BUILDING, A WELL HOUSE FOR A LARGE SPRING.
4       YOU ARE IN A VALLEY IN THE FOREST BESIDE A STREAM TUMBLING ALONG A
4       ROCKY BED.
5       YOU ARE IN OPEN FOREST, WITH A DEEP VALLEY TO ONE SIDE.
6       YOU ARE IN OPEN FOREST NEAR BOTH A VALLEY AND A ROAD.
7       AT YOUR FEET ALL THE WATER OF THE STREAM SPLASHES INTO A 2-INCH SLIT
7       IN THE ROCK.  DOWNSTREAM THE STREAMBED IS BARE ROCK.
8       YOU ARE IN A 20-FOOT DEPRESSION FLOORED WITH BARE DIRT.  SET INTO THE
8       DIRT IS A STRONG STEEL GRATE MOUNTED IN CONCRETE.  A DRY STREAMBED
8       LEADS INTO THE DEPRESSION.
9       YOU ARE IN A SMALL CHAMBER BENEATH A 3X3 STEEL GRATE TO THE SURFACE.
9       A LOW CRAWL OVER COBBLES LEADS INWARD TO THE WEST.
10      YOU ARE CRAWLING OVER COBBLES IN A LOW PASSAGE.  THERE IS A DIM LIGHT
10      AT THE EAST END OF THE PASSAGE.
11      YOU ARE IN A DEBRIS ROOM FILLED WITH STUFF WASHED IN FROM THE SURFACE.
11      A LOW WIDE PASSAGE WITH COBBLES BECOMES PLUGGED WITH MUD AND DEBRIS
11      HERE, BUT AN AWKWARD CANYON LEADS UPWARD AND WEST.  A NOTE ON THE WALL
11      SAYS "MAGIC WORD XYZZY".
12      YOU ARE IN AN AWKWARD SLOPING EAST/WEST CANYON.
13      YOU ARE IN A SPLENDID CHAMBER THIRTY FEET HIGH.  THE WALLS ARE FROZEN
13      RIVERS OF ORANGE STONE.  AN AWKWARD CANYON AND A GOOD PASSAGE EXIT
13      FROM EAST AND WEST SIDES OF THE CHAMBER.
14      AT YOUR FEET IS A SMALL PIT BREATHING TRACES OF WHITE MIST.  AN EAST
14      PASSAGE ENDS HERE EXCEPT FOR A SMALL CRACK LEADING ON.
15      YOU ARE AT ONE END OF A VAST HALL STRETCHING FORWARD OUT OF SIGHT TO
15      THE WEST.  THERE ARE OPENINGS TO EITHER SIDE.  NEARBY, A WIDE STONE
15      STAIRCASE LEADS DOWNWARD.  THE HALL IS FILLED WITH WISPS OF WHITE MIST
15      SWAYING TO AND FRO ALMOST AS IF ALIVE.  A COLD WIND BLOWS UP THE
15      STAIRCASE.  THERE IS A PASSAGE AT THE TOP OF A DOME BEHIND YOU.
16      THE CRACK IS FAR TOO SMALL FOR YOU TO FOLLOW.
17      YOU ARE ON THE EAST BANK OF A FISSURE SLICING CLEAR ACROSS THE HALL.
17      THE MIST IS QUITE THICK HERE, AND THE FISSURE IS TOO WIDE TO JUMP.
18      THIS IS A LOW ROOM WITH A CRUDE NOTE ON THE WALL.  THE NOTE SAYS,
18      "YOU WON'T GET IT UP THE STEPS".
19      YOU ARE IN THE HALL OF THE MOUNTAIN KING, WITH PASSAGES OFF IN ALL
19      DIRECTIONS.
20      YOU ARE AT THE BOTTOM OF THE PIT WITH A BROKEN NECK.
21      YOU DIDN'T MAKE IT.
22      THE DOME IS UNCLIMBABLE.
23      YOU ARE AT THE WEST END OF THE TWOPIT ROOM.  THERE IS A LARGE HOLE IN
23      THE WALL ABOVE THE PIT AT THIS END OF THE ROOM.
24      YOU ARE AT THE BOTTOM OF THE EASTERN PIT IN THE TWOPIT ROOM.  THERE IS
24      A SMALL POOL OF OIL IN ONE CORNER OF THE PIT.
25      YOU ARE AT THE BOTTOM OF THE WESTERN PIT IN THE TWOPIT ROOM.  THERE IS
25      A LARGE HOLE IN THE WALL ABOUT 25 FEET ABOVE YOU.
26      YOU CLAMBER UP THE PLANT AND SCURRY THROUGH THE HOLE AT THE TOP.
27      YOU ARE ON THE WEST SIDE OF THE FISSURE IN THE HALL OF MISTS.
28      YOU ARE IN A LOW N/S PASSAGE AT A HOLE IN THE FLOOR.  THE HOLE GOES
28      DOWN TO AN E/W PASSAGE.
29      YOU ARE IN THE SOUTH SIDE CHAMBER.
30      YOU ARE IN THE WEST SIDE CHAMBER OF THE HALL OF THE MOUNTAIN KING.
30      A PASSAGE CONTINUES WEST AND UP HERE.
31      >$<
32      YOU CAN'T GET BY THE SNAKE.

33      YOU ARE IN A LARGE ROOM, WITH A PASSAGE TO THE SOUTH, A PASSAGE TO THE
33      WEST, AND A WALL OF BROKEN ROCK TO THE EAST.  THERE IS A LARGE "Y2" ON
33      A ROCK IN THE ROOM'S CENTER.
34      YOU ARE IN A JUMBLE OF ROCK, WITH CRACKS EVERYWHERE.
35      YOU'RE AT A LOW WINDOW OVERLOOKING A HUGE PIT, WHICH EXTENDS UP OUT OF
35      SIGHT.  A FLOOR IS INDISTINCTLY VISIBLE OVER 50 FEET BELOW.  TRACES OF
35      WHITE MIST COVER THE FLOOR OF THE PIT, BECOMING THICKER TO THE RIGHT.
35      MARKS IN THE DUST AROUND THE WINDOW WOULD SEEM TO INDICATE THAT
35      SOMEONE HAS BEEN HERE RECENTLY.  DIRECTLY ACROSS THE PIT FROM YOU AND
35      25 FEET AWAY THERE IS A SIMILAR WINDOW LOOKING INTO A LIGHTED ROOM.  A
35      SHADOWY FIGURE CAN BE SEEN THERE PEERING BACK AT YOU.
36      YOU ARE IN A DIRTY BROKEN PASSAGE.  TO THE EAST IS A CRAWL.  TO THE
36      WEST IS A LARGE PASSAGE.  ABOVE YOU IS A HOLE TO ANOTHER PASSAGE.
37      YOU ARE ON THE BRINK OF A SMALL CLEAN CLIMBABLE PIT.  A CRAWL LEADS
37      WEST.
38      YOU ARE IN THE BOTTOM OF A SMALL PIT WITH A LITTLE STREAM, WHICH
38      ENTERS AND EXITS THROUGH TINY SLITS.
39      YOU ARE IN A LARGE ROOM FULL OF DUSTY ROCKS.  THERE IS A BIG HOLE IN
39      THE FLOOR.  THERE ARE CRACKS EVERYWHERE, AND A PASSAGE LEADING EAST.
40      YOU HAVE CRAWLED THROUGH A VERY LOW WIDE PASSAGE PARALLEL TO AND NORTH
40      OF THE HALL OF MISTS.
41      YOU ARE AT THE WEST END OF HALL OF MISTS.  A LOW WIDE CRAWL CONTINUES
41      WEST AND ANOTHER GOES NORTH.  TO THE SOUTH IS A LITTLE PASSAGE 6 FEET
41      OFF THE FLOOR.
42      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
43      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
44      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
45      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
46      DEAD END
47      DEAD END
48      DEAD END
49      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
50      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
51      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
52      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
53      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
54      DEAD END
55      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
56      DEAD END
57      YOU ARE ON THE BRINK OF A THIRTY FOOT PIT WITH A MASSIVE ORANGE COLUMN
57      DOWN ONE WALL.  YOU COULD CLIMB DOWN HERE BUT YOU COULD NOT GET BACK
57      UP.  THE MAZE CONTINUES AT THIS LEVEL.

71      YOU ARE IN A SECRET CANYON AT A JUNCTION OF THREE CANYONS, BEARING
71      NORTH, SOUTH, AND SE.  THE NORTH ONE IS AS TALL AS THE OTHER TWO
71      COMBINED.
72      YOU ARE IN A LARGE LOW ROOM.  CRAWLS LEAD NORTH, SE, AND SW.
73      DEAD END CRAWL.
74      YOU ARE IN A SECRET CANYON WHICH HERE RUNS E/W.  IT CROSSES OVER A
74      VERY TIGHT CANYON 15 FEET BELOW.  IF YOU GO DOWN YOU MAY NOT BE ABLE
74      TO GET BACK UP.
75      YOU ARE AT A WIDE PLACE IN A VERY TIGHT N/S CANYON.
76      THE CANYON HERE BECOMES TOO TIGHT TO GO FURTHER SOUTH.
77      YOU ARE IN A TALL E/W CANYON.  A LOW TIGHT CRAWL GOES 3 FEET NORTH AND
77      SEEMS TO OPEN UP.
78      THE CANYON RUNS INTO A MASS OF BOULDERS -- DEAD END.
79      THE STREAM FLOWS OUT THROUGH A PAIR OF 1 FOOT DIAMETER SEWER PIPES.
79      IT WOULD BE ADVISABLE TO USE THE EXIT.
80      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
81      DEAD END
82      DEAD END
83      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
84      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
85      DEAD END
86      DEAD END
87      YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.
88      YOU ARE IN A LONG, NARROW CORRIDOR STRETCHING OUT OF SIGHT TO THE
88      WEST.  AT THE EASTERN END IS A HOLE THROUGH WHICH YOU CAN SEE A
88      PROFUSION OF LEAVES.
89      THERE IS NOTHING HERE TO CLIMB.  USE "UP" OR "OUT" TO LEAVE THE PIT.
90      YOU HAVE CLIMBED UP THE PLANT AND OUT OF THE PIT.
91      YOU ARE AT THE TOP OF A STEEP INCLINE ABOVE A LARGE ROOM.  YOU COULD
91      CLIMB DOWN HERE, BUT YOU WOULD NOT BE ABLE TO CLIMB UP.  THERE IS A
91      PASSAGE LEADING BACK TO THE NORTH.
92      YOU ARE IN THE GIANT ROOM.  THE CEILING HERE IS TOO HIGH UP FOR YOUR
92      LAMP TO SHOW IT.  CAVERNOUS PASSAGES LEAD EAST, NORTH, AND SOUTH.  ON
92      THE WEST WALL IS SCRAWLED THE INSCRIPTION, "FEE FIE FOE FOO" [SIC].
93      THE PASSAGE HERE IS BLOCKED BY A RECENT CAVE-IN.
94      YOU ARE AT ONE END OF AN IMMENSE NORTH/SOUTH PASSAGE.
95      YOU ARE IN A MAGNIFICENT CAVERN WITH A RUSHING STREAM, WHICH CASCADES
95      OVER A SPARKLING WATERFALL INTO A ROARING WHIRLPOOL WHICH DISAPPEARS
95      THROUGH A HOLE IN THE FLOOR.  PASSAGES EXIT TO THE SOUTH AND WEST.
96      YOU ARE IN THE SOFT ROOM.  THE WALLS ARE COVERED WITH HEAVY CURTAINS,
96      THE FLOOR WITH A THICK PILE CARPET.  MOSS COVERS THE CEILING.
97      THIS IS THE ORIENTAL ROOM.  ANCIENT ORIENTAL CAVE DRAWINGS COVER THE
97      WALLS.  A GENTLY SLOPING PASSAGE LEADS UPWARD TO THE NORTH, ANOTHER
97      PASSAGE LEADS SE, AND A HANDS AND KNEES CRAWL LEADS WEST.
98      YOU ARE FOLLOWING A WIDE PATH AROUND THE OUTER EDGE OF A LARGE CAVERN.
98      FAR BELOW, THROUGH A HEAVY WHITE MIST, STRANGE SPLASHING NOISES CAN BE
98      HEARD.  THE MIST RISES UP THROUGH A FISSURE IN THE CEILING.  THE PATH
98      EXITS TO THE SOUTH AND WEST.
99      YOU ARE IN AN ALCOVE.  A SMALL NW PATH SEEMS TO WIDEN AFTER A SHORT
99      DISTANCE.  AN EXTREMELY TIGHT TUNNEL LEADS EAST.  IT LOOKS LIKE A VERY
99      TIGHT SQUEEZE.  AN EERIE LIGHT CAN BE SEEN AT THE OTHER END.
100     YOU'RE IN A SMALL CHAMBER LIT BY AN EERIE GREEN LIGHT.  AN EXTREMELY
100     NARROW TUNNEL EXITS TO THE WEST.  A DARK CORRIDOR LEADS NE.
101     YOU'RE IN THE DARK-ROOM.  A CORRIDOR LEADING SOUTH IS THE ONLY EXIT.
102     YOU ARE IN AN ARCHED HALL.  A CORAL PASSAGE ONCE CONTINUED UP AND EAST
102     FROM HERE, BUT IS NOW BLOCKED BY DEBRIS.  THE AIR SMELLS OF SEA WATER.
103     YOU'RE IN A LARGE ROOM CARVED OUT OF SEDIMENTARY ROCK.  THE FLOOR AND
103     WALLS ARE LITTERED WITH BITS OF SHELLS IMBEDDED IN THE STONE.  A
103     SHALLOW PASSAGE PROCEEDS DOWNWARD, AND A SOMEWHAT STEEPER ONE LEADS
103     UP.  A LOW HANDS AND KNEES PASSAGE ENTERS FROM THE SOUTH.
104     YOU ARE IN A LONG SLOPING CORRIDOR WITH RAGGED SHARP WALLS.
105     YOU ARE IN A CUL-DE-SAC ABOUT EIGHT FEET ACROSS.
106     YOU ARE IN AN ANTEROOM LEADING TO A LARGE PASSAGE TO THE EAST.  SMALL
106     PASSAGES GO WEST AND UP.  THE REMNANTS OF RECENT DIGGING ARE EVIDENT.
106     A SIGN IN MIDAIR HERE SAYS "CAVE UNDER CONSTRUCTION BEYOND THIS POINT.
106     PROCEED AT OWN RISK.  [WITT CONSTRUCTION COMPANY]"
107     YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL DIFFERENT.
108     YOU ARE AT WITT'S END.  PASSAGES LEAD OFF IN *ALL* DIRECTIONS.
109     YOU ARE IN A NORTH/SOUTH CANYON ABOUT 25 FEET ACROSS.  THE FLOOR IS
109     COVERED BY WHITE MIST SEEPING IN FROM THE NORTH.  THE WALLS EXTEND
109     UPWARD FOR WELL OVER 100 FEET.  SUSPENDED FROM SOME UNSEEN POINT FAR
109     ABOVE YOU, AN ENORMOUS TWO-SIDED MIRROR IS HANGING PARALLEL TO AND
109     MIDWAY BETWEEN THE CANYON WALLS.  (THE MIRROR IS OBVIOUSLY PROVIDED
109     FOR THE USE OF THE DWARVES, WHO AS YOU KNOW, ARE EXTREMELY VAIN.)  A
109     SMALL WINDOW CAN BE SEEN IN EITHER WALL, SOME FIFTY FEET UP.
110     YOU'RE AT A LOW WINDOW OVERLOOKING A HUGE PIT, WHICH EXTENDS UP OUT OF
110     SIGHT.  A FLOOR IS INDISTINCTLY VISIBLE OVER 50 FEET BELOW.  TRACES OF
110     WHITE MIST COVER THE FLOOR OF THE PIT, BECOMING THICKER TO THE LEFT.
110     MARKS IN THE DUST AROUND THE WINDOW WOULD SEEM TO INDICATE THAT
110     SOMEONE HAS BEEN HERE RECENTLY.  DIRECTLY ACROSS THE PIT FROM YOU AND
110     25 FEET AWAY THERE IS A SIMILAR WINDOW LOOKING INTO A LIGHTED ROOM.  A
110     SHADOWY FIGURE CAN BE SEEN THERE PEERING BACK AT YOU.
111     A LARGE STALACTITE EXTENDS FROM THE ROOF AND ALMOST REACHES THE FLOOR
111     BELOW.  YOU COULD CLIMB DOWN IT, AND JUMP FROM IT TO THE FLOOR, BUT
111     HAVING DONE SO YOU WOULD BE UNABLE TO REACH IT TO CLIMB BACK UP.
112     YOU ARE IN A LITTLE MAZE OF TWISTING PASSAGES, ALL DIFFERENT.
113     YOU ARE AT THE EDGE OF A LARGE UNDERGROUND RESERVOIR.  AN OPAQUE CLOUD
113     OF WHITE MIST FILLS THE ROOM AND RISES RAPIDLY UPWARD.  THE LAKE IS
113     FED BY A STREAM, WHICH TUMBLES OUT OF A HOLE IN THE WALL ABOUT 10 FEET
113     OVERHEAD AND SPLASHES NOISILY INTO THE WATER SOMEWHERE WITHIN THE
113     MIST.  THE ONLY PASSAGE GOES BACK TOWARD THE SOUTH.
114     DEAD END
115     YOU ARE AT THE NORTHEAST END OF AN IMMENSE ROOM, EVEN LARGER THAN THE
115     GIANT ROOM.  IT APPEARS TO BE A REPOSITORY FOR THE "ADVENTURE"
115     PROGRAM.  MASSIVE TORCHES FAR OVERHEAD BATHE THE ROOM WITH SMOKY
115     YELLOW LIGHT.  SCATTERED ABOUT YOU CAN BE SEEN A PILE OF BOTTLES (ALL
115     OF THEM EMPTY), A NURSERY OF YOUNG BEANSTALKS MURMURING QUIETLY, A BED
115     OF OYSTERS, A BUNDLE OF BLACK RODS WITH RUSTY STARS ON THEIR ENDS, AND
115     A COLLECTION OF BRASS LANTERNS.  OFF TO ONE SIDE A GREAT MANY DWARVES
115     ARE SLEEPING ON THE FLOOR, SNORING LOUDLY.  A SIGN NEARBY READS: "DO
115     NOT DISTURB THE DWARVES!"  AN IMMENSE MIRROR IS HANGING AGAINST ONE
115     WALL, AND STRETCHES TO THE OTHER END OF THE ROOM, WHERE VARIOUS OTHER
115     SUNDRY OBJECTS CAN BE GLIMPSED DIMLY IN THE DISTANCE.
116     YOU ARE AT THE SOUTHWEST END OF THE REPOSITORY.  TO ONE SIDE IS A PIT
116     FULL OF FIERCE GREEN SNAKES.  ON THE OTHER SIDE IS A ROW OF SMALL
116     WICKER CAGES, EACH OF WHICH CONTAINS A LITTLE SULKING BIRD.  IN ONE
116     CORNER IS A BUNDLE OF BLACK RODS WITH RUSTY MARKS ON THEIR ENDS.  A
116     LARGE NUMBER OF VELVET PILLOWS ARE SCATTERED ABOUT ON THE FLOOR.  A
```

```
C  CAVE CLOSING AND SCORING


C  THESE SECTIONS HANDLE THE CLOSING OF THE CAVE.  THE CAVE CLOSES "CLOCK1"
C  TURNS AFTER THE LAST TREASURE HAS BEEN LOCATED (INCLUDING THE PIRATE'S
C  CHEST, WHICH MAY OF COURSE NEVER SHOW UP).  NOTE THAT THE TREASURES NEED NOT
C  HAVE BEEN TAKEN YET, JUST LOCATED.  HENCE CLOCK1 MUST BE LARGE ENOUGH TO GET
C  OUT OF THE CAVE (IT ONLY TICKS WHILE INSIDE THE CAVE).  WHEN IT HITS ZERO,
C  WE BRANCH TO 10000 TO START CLOSING THE CAVE, AND THEN SIT BACK AND WAIT FOR
C  HIM TO TRY TO GET OUT.  IF HE DOESN'T WITHIN CLOCK2 TURNS, WE CLOSE THE
C  CAVE; IF HE DOES TRY, WE ASSUME HE PANICS, AND GIVE HIM A FEW ADDITIONAL
C  TURNS TO GET FRANTIC BEFORE WE CLOSE.  WHEN CLOCK2 HITS ZERO, WE BRANCH TO
C  11000 TO TRANSPORT HIM INTO THE FINAL PUZZLE.  NOTE THAT THE PUZZLE DEPENDS
C  UPON ALL SORTS OF RANDOM THINGS.  FOR INSTANCE, THERE MUST BE NO WATER OR
C  OIL, SINCE THERE ARE BEANSTALKS WHICH WE DON'T WANT TO BE ABLE TO WATER,
C  SINCE THE CODE CAN'T HANDLE IT.  ALSO, WE CAN HAVE NO KEYS, SINCE THERE IS A
C  GRATE (HAVING MOVED THE FIXED OBJECT!) THERE SEPARATING HIM FROM ALL THE
C  TREASURES.  MOST OF THESE PROBLEMS ARISE FROM THE USE OF NEGATIVE PROP
C  NUMBERS TO SUPPRESS THE OBJECT DESCRIPTIONS UNTIL HE'S ACTUALLY MOVED THE
C  OBJECTS.

C  WHEN THE FIRST WARNING COMES, WE LOCK THE GRATE, DESTROY THE BRIDGE, KILL
C  ALL THE DWARVES (AND THE PIRATE), REMOVE THE TROLL AND BEAR (UNLESS DEAD),
C  AND SET "CLOSNG" TO TRUE.  LEAVE THE DRAGON; TOO MUCH TROUBLE TO MOVE IT.
C  FROM NOW UNTIL CLOCK2 RUNS OUT, HE CANNOT UNLOCK THE GRATE, MOVE TO ANY
C  LOCATION OUTSIDE THE CAVE (LOC<9), OR CREATE THE BRIDGE.  NOR CAN HE BE
C  RESURRECTED IF HE DIES.  NOTE THAT THE SNAKE IS ALREADY GONE, SINCE HE GOT
C  TO THE TREASURE ACCESSIBLE ONLY VIA THE HALL OF THE MT. KING.  ALSO, HE'S
C  BEEN IN GIANT ROOM (TO GET EGGS), SO WE CAN REFER TO IT.  ALSO ALSO, HE'S
C  GOTTEN THE PEARL, SO WE KNOW THE BIVALVE IS AN OYSTER.  *AND*, THE DWARVES
C  MUST HAVE BEEN ACTIVATED, SINCE WE'VE FOUND CHEST.

10000   PROP(GRATE)=0
        PROP(FISSUR)=0
        DO 10010 I=1,6
        DSEEN(I)=.FALSE.
10010   DLOC(I)=0
        CALL MOVE(TROLL,0)
        CALL MOVE(TROLL+100,0)
        CALL MOVE(TROLL2,PLAC(TROLL))
        CALL MOVE(TROLL2+100,FIXD(TROLL))
        CALL JUGGLE(CHASM)
        IF(PROP(BEAR).NE.3)CALL DSTROY(BEAR)
        PROP(CHAIN)=0
        FIXED(CHAIN)=0
        PROP(AXE)=0
        FIXED(AXE)=0
        CALL RSPEAK(129)
        CLOCK1=-1
        CLOSNG=.TRUE.
        GOTO 19999

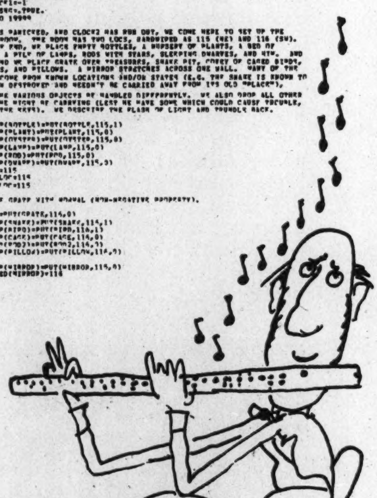
C  ONCE HE'S PANICKED, AND CLOCK2 HAS RUN OUT, WE COME HERE TO SET UP THE
C  STORAGE ROOM.  THE ROOM HAS TWO LOCS, HARDWIRED AS 115 (NE) AND 116 (SW).
C  AT THE NE END, WE PLACE EMPTY BOTTLES, A NURSERY OF PLANTS, A BED OF
C  OYSTERS, A PILE OF LAMPS, RODS WITH STARS, SLEEPING DWARVES, AND HIM.  AND
C  THE SW END WE PLACE GRATE OVER TREASURES, SNAKE PIT, COVEY OF CAGED BIRDS,
C  MORE RODS, AND PILLOWS.  A MIRROR STRETCHES ACROSS ONE WALL.  MANY OF THE
C  OBJECTS COME FROM KNOWN LOCATIONS AND/OR STATES (E.G. THE SNAKE IS KNOWN TO
C  HAVE BEEN DESTROYED AND NEEDN'T BE CARRIED AWAY FROM ITS OLD "PLACE"),
C  MAKING THE VARIOUS OBJECTS BE HANDLED DIFFERENTLY.  WE ALSO DROP ALL OTHER
C  OBJECTS HE MIGHT BE CARRYING (LEST HE HAVE SOME WHICH COULD CAUSE TROUBLE,
C  SUCH AS THE KEYS).  WE DESCRIBE THE FLASH OF LIGHT AND TRUNDLE BACK.

11000   PROP(BOTTLE)=PUT(BOTTLE,115,1)
        PROP(PLANT)=PUT(PLANT,115,0)
        PROP(OYSTER)=PUT(OYSTER,115,0)
        PROP(LAMP)=PUT(LAMP,115,0)
        PROP(ROD)=PUT(ROD,115,0)
        PROP(DWARF)=PUT(DWARF,115,0)
        LOC=115
        OLDLOC=115
        NEWLOC=115

C  LEAVE THE GRATE WITH NORMAL (NON-NEGATIVE PROPERTY).

        FOO=PUT(GRATE,116,0)
        PROP(SNAKE)=PUT(SNAKE,116,1)
        PROP(BIRD)=PUT(BIRD,116,1)
        PROP(CAGE)=PUT(CAGE,116,0)
        PROP(ROD2)=PUT(ROD2,116,0)
        PROP(PILLOW)=PUT(PILLOW,116,0)

        PROP(MIRROR)=PUT(MIRROR,115,0)
        FIXED(MIRROR)=116
```



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C  ADVENTURES

C  CURRENT LIMITS:
C      9650 WORDS OF MESSAGE TEXT (LINES, LINSIZ).
C       750 TRAVEL OPTIONS (TRAVEL, TRVSIZ).
C       300 VOCABULARY WORDS (KTAB, ATAB, TABSIZ).
C       150 LOCATIONS (LTEXT, STEXT, KEY, COND, ABB, ATLOC, LOCSIZ).
C       100 OBJECTS (PLAC, PLACE, FIXD, FIXED, LINK (TWICE), PTEXT, PROP).
C        35 "ACTION" VERBS (ACTSPK, VRBSIZ).
C       205 RANDOM MESSAGES (RTEXT, RTXSIZ).
C        12 DIFFERENT PLAYER CLASSIFICATIONS (CTEXT, CVAL, CLSMAX).
C        20 HINTS, LESS 3 (HINTLC, HINTED, HINTS, HNTSIZ).
C        35 MAGIC MESSAGES (MTEXT, MAGSIZ).
C  THERE ARE ALSO LIMITS WHICH CANNOT BE EXCEEDED DUE TO THE STRUCTURE OF
C  THE DATABASE.  (E.G., THE VOCABULARY USES N/1000 TO DETERMINE WORD TYPE,
C  SO THERE CAN'T BE MORE THAN 1000 WORDS.)  THESE UPPER LIMITS ARE:
C      1000 NON-SYNONYMOUS VOCABULARY WORDS
C       300 LOCATIONS
C       100 OBJECTS

      IMPLICIT INTEGER(A-Z)
      LOGICAL DSEEN,BLKLIN,HINTED,YEA,START

      COMMON /TXTCOM/ RTEXT,LINES
      COMMON /BLKCOM/ BLKLIN
      COMMON /VOCCOM/ KTAB,ATAB,TABSIZ
      COMMON /PLACOM/ ATLOC,LINK,PLACE,FIXED,HOLDNG
      COMMON /MTXCOM/ MTEXT
      COMMON /PTXCOM/ PTEXT
      COMMON /ABBCOM/ ABB
      COMMON /MISCOM/ WKDAY,WKEND,HOLID,HBEGIN,HEND,HNAME,
     1        SHORT,MAGIC,MAGNM,LATNCY,SAVED,SAVET,SETUP

      DIMENSION LINES(9650)
      DIMENSION TRAVEL(750)
      DIMENSION KTAB(300),ATAB(300)
      DIMENSION LTEXT(150),STEXT(150),KEY(150),COND(150),ABB(150),
     1        ATLOC(150)
      DIMENSION PLAC(100),PLACE(100),FIXD(100),FIXED(100),LINK(200),
     1        PTEXT(100),PROP(100)
      DIMENSION ACTSPK(35)
      DIMENSION RTEXT(205)
      DIMENSION CTEXT(12),CVAL(12)
      DIMENSION HINTLC(20),HINTED(20),HINTS(20,4)
      DIMENSION MTEXT(35)
      DIMENSION TK(20),DSEEN(6),DLOC(6),ODLOC(6),HNAME(4)

      DATA LINSIZ/9650/,TRVSIZ/750/,TABSIZ/300/,LOCSIZ/150/,
     1  VRBSIZ/35/,RTXSIZ/205/,CLSMAX/12/,HNTSIZ/20/,MAGSIZ/35/
      DATA SETUP/0/,BLKLIN/.TRUE./

C  STATEMENT FUNCTIONS
C
C  TOTING(OBJ)   = TRUE IF THE OBJ IS BEING CARRIED
C  HERE(OBJ)     = TRUE IF THE OBJ IS AT "LOC" (OR IS BEING CARRIED)
C  AT(OBJ)       = TRUE IF ON EITHER SIDE OF TWO-PLACED OBJECT
C  LIQ(DUMMY)    = OBJECT NUMBER OF LIQUID IN BOTTLE
C  LIQLOC(LOC)   = OBJECT NUMBER OF LIQUID (IF ANY) AT LOC
C  BITSET(L,N)   = TRUE IF COND(L) HAS BIT N SET (BIT 0 IS UNITS BIT)
C  FORCED(LOC)   = TRUE IF LOC MOVES WITHOUT ASKING FOR INPUT (COND=2)
C  DARK(DUMMY)   = TRUE IF LOCATION "LOC" IS DARK
C  PCT(N)        = TRUE N% OF THE TIME (N INTEGER FROM 0 TO 100)
C
C  WZDARK SAYS WHETHER THE LOC HE'S LEAVING WAS DARK
C  LMWARN SAYS WHETHER HE'S BEEN WARNED ABOUT LAMP GOING DIM
C  CLOSNG SAYS WHETHER ITS CLOSING TIME YET
C  PANIC SAYS WHETHER HE'S FOUND OUT HE'S TRAPPED IN THE CAVE
C  CLOSED SAYS WHETHER WE'RE ALL THE WAY CLOSED
C  GAVEUP SAYS WHETHER HE EXITED VIA "QUIT"
C  SCORNG INDICATES TO THE SCORE ROUTINE WHETHER WE'RE DOING A "SCORE" COMMAND
C  DEMO IS TRUE IF THIS IS A PRIME-TIME DEMONSTRATION GAME
C  YEA IS RANDOM YES/NO REPLY

      LOGICAL TOTING,HERE,AT,BITSET,DARK,WZDARK,LMWARN,CLOSNG,PANIC,
     1        CLOSED,GAVEUP,SCORNG,DEMO,YEA

      TOTING(OBJ)=PLACE(OBJ).EQ.-1
      HERE(OBJ)=PLACE(OBJ).EQ.LOC.OR.TOTING(OBJ)
      AT(OBJ)=PLACE(OBJ).EQ.LOC.OR.FIXED(OBJ).EQ.LOC
      LIQ2(PBOTL)=(1-PBOTL)*WATER+(PBOTL/2)*(WATER+OIL)
      LIQ(DUMMY)=LIQ2(MAX0(PROP(BOTTLE),-1-PROP(BOTTLE)))
      LIQLOC(LOC)=LIQ2((MOD(COND(LOC)/2*2,8)-5)*MOD(COND(LOC)/4,2)+1)
      BITSET(L,N)=(COND(L).AND.SHIFT(1,N)).NE.0
      FORCED(LOC)=COND(LOC).EQ.2
      DARK(DUMMY)=MOD(COND(LOC),2).EQ.0.AND.(PROP(LAMP).EQ.0.OR.
     1        .NOT.HERE(LAMP))
      PCT(N)=RAN(100).LT.N

C  DESCRIPTION OF THE DATABASE FORMAT
C
C
C  THE DATA FILE CONTAINS SEVERAL SECTIONS.  EACH BEGINS WITH A LINE CONTAINING
C  A NUMBER IDENTIFYING THE SECTION, AND ENDS WITH A LINE CONTAINING "-1".
C
C  SECTION 1: LONG FORM DESCRIPTIONS.  EACH LINE CONTAINS A LOCATION NUMBER,
C       A TAB, AND A LINE OF TEXT.  THE SET OF (NECESSARILY ADJACENT) LINES
C       WHOSE NUMBERS ARE X FORM THE LONG DESCRIPTION OF LOCATION X.
C  SECTION 2: SHORT FORM DESCRIPTIONS.  SAME FORMAT AS LONG FORM.  NOT ALL
C       PLACES HAVE SHORT DESCRIPTIONS.
C  SECTION 3: TRAVEL TABLE.  EACH LINE CONTAINS A LOCATION NUMBER (X), A SECOND
C       LOCATION NUMBER (Y), AND A LIST OF MOTION NUMBERS (SEE SECTION 4).
C       EACH MOTION REPRESENTS A VERB WHICH WILL GO TO Y IF CURRENTLY AT X.
C       Y, IN TURN, IS INTERPRETED AS FOLLOWS.  LET M=Y/1000, N=Y MOD 1000.
C               IF N<=300       IT IS THE LOCATION TO GO TO.
C               IF 300<N<=500   N-300 IS USED IN A COMPUTED GOTO TO
C                                       A SECTION OF SPECIAL CODE.
C               IF N>500        MESSAGE N-500 FROM SECTION 6 IS PRINTED,
C                                       AND HE STAYS WHEREVER HE IS.
C       MEANWHILE, M SPECIFIES THE CONDITIONS ON THE MOTION.
C               IF M=0          IT'S UNCONDITIONAL.
C               IF 0<M<100      IT IS DONE WITH M% PROBABILITY.
C               IF M=100        UNCONDITIONAL, BUT FORBIDDEN TO DWARVES.
C               IF 100<M<=200   HE MUST BE CARRYING OBJECT M-100.
C               IF 200<M<=300   MUST BE CARRYING OR IN SAME ROOM AS M-200.
C               IF 300<M<=400   PROP(M MOD 100) MUST *NOT* BE 0.
C               IF 400<M<=500   PROP(M MOD 100) MUST *NOT* BE 1.
C               IF 500<M<=600   PROP(M MOD 100) MUST *NOT* BE 2, ETC.
C       IF THE CONDITION (IF ANY) IS NOT MET, THEN THE NEXT *DIFFERENT*
C       "DESTINATION" VALUE IS USED (UNLESS IT FAILS TO MEET *ITS* CONDITIONS,
C       IN WHICH CASE THE NEXT IS FOUND, ETC.).  TYPICALLY, THE NEXT DEST WILL
C       BE FOR ONE OF THE SAME VERBS, SO THAT ITS ONLY USE IS AS THE ALTERNATE
C       DESTINATION FOR THOSE VERBS.  FOR INSTANCE:
C               15      110022  29      31      34      35      23      43
C               15      14      29
C       THIS SAYS THAT, FROM LOC 15, ANY OF THE VERBS 29, 31, ETC., WILL TAKE
C       HIM TO 22 IF HE'S CARRYING OBJECT 10, AND OTHERWISE WILL GO TO 14.
C               11      303008  49
C               11      9       50
C       THIS SAYS THAT, FROM 11, 49 TAKES HIM TO 8 UNLESS PROP(3)=0, IN WHICH
C       CASE HE GOES TO 9.  VERB 50 TAKES HIM TO 9 REGARDLESS OF PROP(3).
C  SECTION 4: VOCABULARY.  EACH LINE CONTAINS A NUMBER (N), A TAB, AND A
C       FIVE-LETTER WORD.  CALL M=N/1000.  IF M=0, THEN THE WORD IS A MOTION
C       VERB FOR USE IN TRAVELLING (SEE SECTION 3).  ELSE, IF M=1, THE WORD IS
C       AN OBJECT.  ELSE, IF M=2, THE WORD IS AN ACTION VERB (SUCH AS "CARRY"
C       OR "ATTACK").  ELSE, IF M=3, THE WORD IS A SPECIAL CASE VERB (SUCH AS
C       "DIG") AND N MOD 1000 IS AN INDEX INTO SECTION 6.  OBJECTS FROM 50 TO
C       (CURRENTLY, ANYWAY) 79 ARE CONSIDERED TREASURES (FOR PIRATE, CLOSEOUT).
C  SECTION 5: OBJECT DESCRIPTIONS.  EACH LINE CONTAINS A NUMBER (N), A TAB,
C       AND A MESSAGE.  IF N IS FROM 1 TO 100, THE MESSAGE IS THE "INVENTORY"
C       MESSAGE FOR OBJECT N.  OTHERWISE, N SHOULD BE 000, 100, 200, ETC., AND
C       THE MESSAGE SHOULD BE THE DESCRIPTION OF THE PRECEDING OBJECT WHEN ITS
C       PROP VALUE IS N/100.  THE N/100 IS USED ONLY TO DISTINGUISH MULTIPLE
C       MESSAGES FROM MULTI-LINE MESSAGES; THE PROP INFO ACTUALLY REQUIRES ALL
C       MESSAGES FOR AN OBJECT TO BE PRESENT AND CONSECUTIVE.  PROPERTIES WHICH
C       PRODUCE NO MESSAGE SHOULD BE GIVEN THE MESSAGE ">$<".
C  SECTION 6: ARBITRARY MESSAGES.  SAME FORMAT AS SECTIONS 1, 2, AND 5, EXCEPT
C       THE NUMBERS BEAR NO RELATION TO ANYTHING (EXCEPT FOR SPECIAL VERBS
C       IN SECTION 4).
C  SECTION 7: OBJECT LOCATIONS.  EACH LINE CONTAINS AN OBJECT NUMBER AND ITS
C       INITIAL LOCATION (ZERO (OR OMITTED) IF NONE).  IF THE OBJECT IS
C       IMMOVABLE, THE LOCATION IS FOLLOWED BY A "-1".  IF IT HAS TWO LOCATIONS
C       (E.G. THE GRATE) THE FIRST LOCATION IS FOLLOWED WITH THE SECOND, AND
C       THE OBJECT IS ASSUMED TO BE IMMOVABLE.
C  SECTION 8: ACTION DEFAULTS.  EACH LINE CONTAINS AN "ACTION-VERB" NUMBER AND
C       THE INDEX (IN SECTION 6) OF THE DEFAULT MESSAGE FOR THE VERB.
C  SECTION 9: LIQUID ASSETS, ETC.  EACH LINE CONTAINS A NUMBER (N) AND UP TO 20
C       LOCATION NUMBERS.  BIT N (WHERE 0 IS THE UNITS BIT) IS SET IN COND(LOC)
C       FOR EACH LOC GIVEN.  THE COND BITS CURRENTLY ASSIGNED ARE:
C               0       LIGHT
C               1       IF BIT 2 IS ON: ON FOR OIL, OFF FOR WATER
C               2       LIQUID ASSET, SEE BIT 1
C               3       PIRATE DOESN'T GO HERE UNLESS FOLLOWING PLAYER
C       OTHER BITS ARE USED TO INDICATE AREAS OF INTEREST TO "HINT" ROUTINES:
C               4       TRYING TO GET INTO CAVE
C               5       TRYING TO CATCH BIRD
C               6       TRYING TO DEAL WITH SNAKE
C               7       LOST IN MAZE
C               8       PONDERING DARK ROOM
C               9       AT WITT'S END
C       COND(LOC) IS SET TO 2, OVERRIDING ALL OTHER BITS, IF LOC HAS FORCED
C       MOTION.
C  SECTION 10: CLASS MESSAGES.  EACH LINE CONTAINS A NUMBER (N), A TAB, AND A
C       MESSAGE DESCRIBING A CLASSIFICATION OF PLAYER.  THE SCORING SECTION
C       SELECTS THE APPROPRIATE MESSAGE, WHERE EACH MESSAGE IS CONSIDERED TO
C       APPLY TO PLAYERS WHOSE SCORES ARE HIGHER THAN THE PREVIOUS N BUT NOT
C       HIGHER THAN THIS N.  NOTE THAT THESE SCORES PROBABLY CHANGE WITH EVERY
C       MODIFICATION (AND PARTICULARLY EXPANSION) OF THE PROGRAM.
C  SECTION 11: HINTS.  EACH LINE CONTAINS A HINT NUMBER (CORRESPONDING TO A
C       COND BIT, SEE SECTION 9), THE NUMBER OF TURNS HE MUST BE AT THE RIGHT
C       LOC(S) BEFORE TRIGGERING THE HINT, THE POINTS DEDUCTED FOR TAKING THE
C       HINT, THE MESSAGE NUMBER (SECTION 6) OF THE QUESTION, AND THE MESSAGE
C       NUMBER OF THE HINT.  THESE VALUES ARE STASHED IN THE "HINTS" ARRAY.
C       HNTMAX IS SET TO THE MAX HINT NUMBER (<= HNTSIZ).  NUMBERS 1-3 ARE
C       UNUSABLE SINCE COND BITS ARE OTHERWISE ASSIGNED, SO 2 IS USED TO
C       REMEMBER IF HE'S READ THE CLUE IN THE REPOSITORY, AND 3 IS USED TO
C       REMEMBER WHETHER HE ASKED FOR INSTRUCTIONS (GETS MORE TURNS, BUT LOSES
C       POINTS).
C  SECTION 12: MAGIC MESSAGES. IDENTICAL TO SECTION 6 EXCEPT PUT IN A SEPARATE
C       SECTION FOR EASIER REFERENCE.  MAGIC MESSAGES ARE USED BY THE STARTUP,
C       MAINTENANCE MODE, AND RELATED ROUTINES.
C  SECTION 0: END OF DATABASE.


C  READ THE DATABASE IF WE HAVE NOT YET DONE SO

      IF(SETUP.NE.0)GOTO 1100
      TYPE 1000
1000  FORMAT(' INITIALISING...')

C  CLEAR OUT THE VARIOUS TEXT-POINTER ARRAYS.  ALL TEXT IS STORED IN ARRAY
C  LINES; EACH LINE IS PRECEDED BY A WORD POINTING TO THE NEXT POINTER (I.E.
C  THE WORD FOLLOWING THE END OF THE LINE).  THE POINTER IS NEGATIVE IF THIS IS
C  FIRST LINE OF A MESSAGE.  THE TEXT-POINTER ARRAYS CONTAIN INDICES OF
C  POINTER-WORDS IN LINES.  STEXT(N) IS SHORT DESCRIPTION OF LOCATION N.
C  LTEXT(N) IS LONG DESCRIPTION.  PTEXT(N) POINTS TO MESSAGE FOR PROP(N)=0.
C  SUCCESSIVE PROP MESSAGES ARE FOUND BY CHASING POINTERS.  RTEXT CONTAINS
C  SECTION 6'S STUFF.  CTEXT(N) POINTS TO A PLAYER-CLASS MESSAGE.  MTEXT IS FOR
C  SECTION 12.  WE ALSO CLEAR COND.  SEE DESCRIPTION OF SECTION 9 FOR DETAILS.

      DO 1001 I=1,300
      IF(I.LE.100)PTEXT(I)=0
      IF(I.LE.RTXSIZ)RTEXT(I)=0
      IF(I.LE.CLSMAX)CTEXT(I)=0
      IF(I.LE.MAGSIZ)MTEXT(I)=0
      IF(I.GT.LOCSIZ)GOTO 1001
      STEXT(I)=0
      LTEXT(I)=0
      COND(I)=0
      KEY(I)=0
1001  CONTINUE

      CALL IFILE(1,"TEXT")
      SETUP=1
      LINUSE=1
      TRVS=1
      CLSSES=1

C  START NEW DATA SECTION.  SECT IS THE SECTION NUMBER.

1002  READ(1,1003)SECT
1003  FORMAT(G)
      OLDLOC=-1
      GOTO(1100,1004,1004,1030,1040,1004,1004,1050,1060,1070,1004,
     1    1080,1004)(SECT+1)
C          (0)  (1)  (2)  (3)  (4)  (5)  (6)  (7)  (8)  (9)  (10)
C          (11) (12)
      CALL BUG(9)

C  SECTIONS 1, 2, 5, 6, 10, 12.  READ MESSAGES AND SET UP POINTERS.
```

```
1004  READ(1,1005)LOC,(LINES(J),J=LINUSE+1,LINUSE+14),KK
1005  FORMAT(G,15A5)
      IF(KK.NE." ")CALL BUG(0)
      IF(LOC.EQ.-1)GOTO 1002
      DO 1006 K=1,14
      KK=LINUSE+15-K
      IF(LINES(KK).NE." ")GOTO 1007
1006  CONTINUE
      IF(LOC.EQ.0)GOTO 1004
C  ABOVE KLUGE IS TO AVOID F40 BUG IF CRLF BROKEN ACROSS RECORD BOUNDARY
      CALL BUG(1)
1007  LINES(LINUSE)=KK+1
      IF(LOC.EQ.OLDLOC)GOTO 1020
      LINES(LINUSE)=-LINES(LINUSE)

      IF(SECT.EQ.12)GOTO 1013
      IF(SECT.EQ.10)GOTO 1012
      IF(SECT.EQ.6)GOTO 1011
      IF(SECT.EQ.5)GOTO 1010
      IF(SECT.EQ.1)GOTO 1008

      STEXT(LOC)=LINUSE
      GOTO 1020

1008  LTEXT(LOC)=LINUSE
      GOTO 1020

1010  IF(LOC.GT.0.AND.LOC.LE.100)PTEXT(LOC)=LINUSE
      GOTO 1020

1011  IF(LOC.GT.RTXSIZ)CALL BUG(6)
      RTEXT(LOC)=LINUSE
      GOTO 1020

1012  CTEXT(CLSSES)=LINUSE
      CVAL(CLSSES)=LOC
      CLSSES=CLSSES+1
      GOTO 1020

1013  IF(LOC.GT.MAGSIZ)CALL BUG(6)
      MTEXT(LOC)=LINUSE

1020  LINUSE=KK+1
      LINES(LINUSE)=-1
      OLDLOC=LOC
      IF(LINUSE+14.GT.LINSIZ)CALL BUG(2)
      GOTO 1004

C  THE STUFF FOR SECTION 3 IS ENCODED HERE.  EACH "FROM-LOCATION" GETS A
C  CONTIGUOUS SECTION OF THE "TRAVEL" ARRAY.  EACH ENTRY IN TRAVEL IS
C  NEWLOC*1000 + KEYWORD (FROM SECTION 4, MOTION VERBS), AND IS NEGATED IF
C  THIS IS THE LAST ENTRY FOR THIS LOCATION.  KEY(N) IS THE INDEX IN TRAVEL
C  OF THE FIRST OPTION AT LOCATION N.

1030  READ(1,1031)LOC,NEWLOC,TK
1031  FORMAT(99G)
      IF(LOC.EQ.0)GOTO 1030
C  ABOVE KLUGE IS TO AVOID AFOREMENTIONED F40 BUG
      IF(LOC.EQ.-1)GOTO 1002


C  HERE WE READ IN THE VOCABULARY.  KTAB(N) IS THE WORD NUMBER, ATAB(N) IS
C  THE CORRESPONDING WORD.  THE -1 AT THE END OF SECTION 4 IS LEFT IN KTAB
C  AS AN END-MARKER.  THE WORDS ARE GIVEN A MINIMAL HASH TO MAKE READING THE
C  CORE-IMAGE HARDER.  NOTE THAT '/7-08' HAD BETTER NOT BE IN THE LIST, SINCE
C  IT COULD HASH TO -1.

1040  DO 1042 TABNDX=1,TABSIZ
1043  READ(1,1041)KTAB(TABNDX),ATAB(TABNDX)
1041  FORMAT(G,A5)
      IF(KTAB(TABNDX).EQ.0)GOTO 1043
C  ABOVE KLUGE IS TO AVOID AFOREMENTIONED F40 BUG
      IF(KTAB(TABNDX).EQ.-1)GOTO 1002
1042  ATAB(TABNDX)=ATAB(TABNDX).XOR."PHROG"
      CALL BUG(4)

C  READ IN THE INITIAL LOCATIONS FOR EACH OBJECT.  ALSO THE IMMOVABILITY INFO.
C  PLAC CONTAINS INITIAL LOCATIONS OF OBJECTS.  FIXD IS -1 FOR IMMOVABLE
C  OBJECTS (INCLUDING THE SNAKE), OR = SECOND LOC FOR TWO-PLACED OBJECTS.

1050  READ(1,1031)OBJ,J,K
      IF(OBJ.EQ.-1)GOTO 1002
      PLAC(OBJ)=J
      FIXD(OBJ)=K
      GOTO 1050

C  READ DEFAULT MESSAGE NUMBERS FOR ACTION VERBS, STORE IN ACTSPK.

1060  READ(1,1031)VERB,J
      IF(VERB.EQ.-1)GOTO 1002
      ACTSPK(VERB)=J
      GOTO 1060

C  READ INFO ABOUT AVAILABLE LIQUIDS AND OTHER CONDITIONS, STORE IN COND.

1070  READ(1,1031)K,TK
      IF(K.EQ.-1)GOTO 1002
      DO 1071 I=1,20
      LOC=TK(I)
      IF(LOC.EQ.0)GOTO 1070
      IF(BITSET(LOC,K))CALL BUG(8)
1071  COND(LOC)=COND(LOC)+SHIFT(1,K)
      GOTO 1070

C  READ DATA FOR HINTS.

1080  HNTMAX=0
1081  READ(1,1031)K,TK
      IF(K.EQ.-1)GOTO 1002
      IF(K.EQ.0)GOTO 1081
      IF(K.LT.0.OR.K.GT.HNTSIZ)CALL BUG(7)
      DO 1083 I=1,4
1083  HINTS(K,I)=TK(I)
      HNTMAX=MAX0(HNTMAX,K)
      GOTO 1081

C  FINISH CONSTRUCTING INTERNAL DATA FORMAT

C  IF SETUP=2 WE DON'T NEED TO DO THIS.  IT'S ONLY NECESSARY IF WE HAVEN'T DONE
C  IT AT ALL OR IF THE PROGRAM HAS BEEN RUN SINCE THEN.

1100  IF(SETUP.EQ.2)GOTO 1
      IF(SETUP.EQ.-1)GOTO 8305

C  HAVING READ IN THE DATABASE, CERTAIN THINGS ARE NOW CONSTRUCTED.  PROPS ARE
C  SET TO ZERO.  WE FINISH SETTING UP COND BY CHECKING FOR FORCED-MOTION TRAVEL
C  ENTRIES.  THE PLAC AND FIXD ARRAYS ARE USED TO SET UP ATLOC(N) AS THE FIRST
C  OBJECT AT LOCATION N, AND LINK(OBJ) AS THE NEXT OBJECT AT THE SAME LOCATION
C  AS OBJ.  (OBJ>100 INDICATES THAT FIXED(OBJ-100)=LOC; LINK(OBJ) IS STILL THE
C  CORRECT LINK TO USE.)  ABB IS ZEROED; IT CONTROLS WHETHER THE ABBREVIATED
C  DESCRIPTION IS PRINTED.  COUNTS MOD 5 UNLESS "LOOK" IS USED.

      DO 1101 I=1,100
      PLACE(I)=0
      PROP(I)=0
      LINK(I)=0
1101  LINK(I+100)=0

      DO 1102 I=1,LOCSIZ
      ABB(I)=0
      IF(LTEXT(I).EQ.0.OR.KEY(I).EQ.0)GOTO 1102
      K=KEY(I)
      IF(MOD(IABS(TRAVEL(K)),1000).EQ.1)COND(I)=2
1102  ATLOC(I)=0

C  SET UP THE ATLOC AND LINK ARRAYS AS DESCRIBED ABOVE.  WE'LL USE THE DROP
C  SUBROUTINE, WHICH PREFACES NEW OBJECTS ON THE LISTS.  SINCE WE WANT THINGS
C  IN THE OTHER ORDER, WE'LL RUN THE LOOP BACKWARDS.  IF THE OBJECT IS IN TWO
C  LOCS, WE DROP IT TWICE.  THIS ALSO SETS UP "PLACE" AND "FIXED" AS COPIES OF
C  "PLAC" AND "FIXD".  ALSO, SINCE TWO-PLACED OBJECTS ARE TYPICALLY BEST

      CALL RSPEAK(3)
      CALL DROP(AXE,LOC)
      GOTO 2000

C  THINGS ARE IN FULL SWING.  MOVE EACH DWARF AT RANDOM, EXCEPT IF HE'S SEEN US
C  HE STICKS WITH US.  DWARVES NEVER GO TO LOCS <15.  IF WANDERING AT RANDOM,
C  THEY DON'T BACK UP UNLESS THERE'S NO ALTERNATIVE.  IF THEY DON'T HAVE TO
C  MOVE, THEY ATTACK.  AND, OF COURSE, DEAD DWARVES DON'T DO MUCH OF ANYTHING.

6010  DTOTAL=0
      ATTACK=0
      STICK=0
      DO 6030 I=1,6
      IF(DLOC(I).EQ.0)GOTO 6030
      J=1
      KK=DLOC(I)
      KK=KEY(KK)
      IF(KK.EQ.0)GOTO 6016
6012  NEWLOC=MOD(IABS(TRAVEL(KK))/1000,1000)
      IF(NEWLOC.GT.300.OR.NEWLOC.LT.15.OR.NEWLOC.EQ.ODLOC(I)
     1        .OR.(J.GT.1.AND.NEWLOC.EQ.TK(J-1)).OR.J.GE.20
     2        .OR.NEWLOC.EQ.DLOC(I).OR.FORCED(NEWLOC)
     3        .OR.(I.EQ.6.AND.BITSET(NEWLOC,3))
     4        .OR.IABS(TRAVEL(KK))/1000000.EQ.100)GOTO 6014
      TK(J)=NEWLOC
      J=J+1
6014  KK=KK+1
      IF(TRAVEL(KK-1).GE.0)GOTO 6012
6016  TK(J)=ODLOC(I)
      IF(J.GE.2)J=J-1
      J=1+RAN(J)
      ODLOC(I)=DLOC(I)
      DLOC(I)=TK(J)
      DSEEN(I)=(DSEEN(I).AND.LOC.GE.15)
     1        .OR.(DLOC(I).EQ.LOC.OR.ODLOC(I).EQ.LOC)
      IF(.NOT.DSEEN(I))GOTO 6030
      DLOC(I)=LOC
      IF(I.NE.6)GOTO 6027

C  THE PIRATE'S SPOTTED HIM.  HE LEAVES HIM ALONE ONCE WE'VE FOUND CHEST.
C  K COUNTS IF A TREASURE IS HERE.  IF NOT, AND TALLY=TALLY2 PLUS ONE FOR
C  AN UNSEEN CHEST, LET THE PIRATE BE SPOTTED.

      IF(LOC.EQ.CHLOC.OR.PROP(CHEST).GE.0)GOTO 6030
      K=0
      DO 6020 J=50,MAXTRS
C  PIRATE WON'T TAKE PYRAMID FROM PLOVER ROOM OR DARK ROOM (TOO EASY!).
      IF(J.EQ.PYRAM.AND.(LOC.EQ.PLAC(PYRAM)
     1        .OR.LOC.EQ.PLAC(EMRALD)))GOTO 6020
      IF(TOTING(J))GOTO 6022
6020  IF(HERE(J))K=1
      IF(TALLY.EQ.TALLY2+1.AND.K.EQ.0.AND.PLACE(CHEST).EQ.0
     1        .AND.HERE(LAMP).AND.PROP(LAMP).EQ.1)GOTO 6025
      IF(ODLOC(6).NE.DLOC(6).AND.PCT(20))CALL RSPEAK(127)
      GOTO 6030

6022  CALL RSPEAK(128)
C  DON'T STEAL CHEST BACK FROM TROLL!
      IF(PLACE(MESSAG).EQ.0)CALL MOVE(CHEST,CHLOC)
      CALL MOVE(MESSAG,CHLOC2)
      DO 6023 J=50,MAXTRS
      IF(J.EQ.PYRAM.AND.(LOC.EQ.PLAC(PYRAM)
     1        .OR.LOC.EQ.PLAC(EMRALD)))GOTO 6023
      IF(AT(J).AND.FIXED(J).EQ.0)CALL CARRY(J,LOC)
      IF(TOTING(J))CALL DROP(J,CHLOC)
6023  CONTINUE
6024  DLOC(6)=CHLOC
      ODLOC(6)=CHLOC
      DSEEN(6)=.FALSE.
      GOTO 6030

6025  CALL RSPEAK(186)
      CALL MOVE(CHEST,CHLOC)
      CALL MOVE(MESSAG,CHLOC2)
      GOTO 6024

C  THIS THREATENING LITTLE DWARF IS IN THE ROOM WITH HIM!

6027  DTOTAL=DTOTAL+1
      IF(ODLOC(I).NE.DLOC(I))GOTO 6030
      ATTACK=ATTACK+1
      IF(KNFLOC.GE.0)KNFLOC=LOC
      IF(RAN(1000).LT.95*(DFLAG-2))STICK=STICK+1
6030  CONTINUE

C  NOW WE KNOW WHAT'S HAPPENING.  LET'S TELL THE POOR SUCKER ABOUT IT.

      IF(DTOTAL.EQ.0)GOTO 2000
      IF(DTOTAL.EQ.1)GOTO 75
      TYPE 67,DTOTAL
```

```
67    FORMAT(/' THERE ARE ',I1,' THREATENING LITTLE DWARVES IN THE'
     1        ,' ROOM WITH YOU.')
      GOTO 77
75    CALL RSPEAK(4)
77    IF(ATTACK.EQ.0)GOTO 2000
      IF(DFLAG.EQ.2)DFLAG=3
C  IF SAVED NOT = -1, HE BYPASSED THE "START" CALL.  DWARVES GET *VERY* MAD!
      IF(SAVED.NE.-1)DFLAG=20
      IF(ATTACK.EQ.1)GOTO 79
      TYPE 78,ATTACK
78    FORMAT(/' ',I1,' OF THEM THROW KNIVES AT YOU!')
      K=6
82    IF(STICK.GT.1)GOTO 83
      CALL RSPEAK(K+STICK)
      IF(STICK.EQ.0)GOTO 2000
      GOTO 84
83    TYPE 68,STICK
68    FORMAT(/' ',I1,' OF THEM GET YOU!')
84    OLDLC2=LOC
      GOTO 99

79    CALL RSPEAK(5)
      K=52

C  ROUTINES FOR PERFORMING THE VARIOUS ACTION VERBS

C  STATEMENT NUMBERS IN THIS SECTION ARE 8000 FOR INTRANSITIVE VERBS, 9000 FOR
C  TRANSITIVE, PLUS TEN TIMES THE VERB NUMBER.  MANY INTRANSITIVE VERBS USE THE
C  TRANSITIVE CODE, AND SOME VERBS USE CODE FOR OTHER VERBS, AS NOTED BELOW.

C  RANDOM INTRANSITIVE VERBS COME HERE.  CLEAR OBJ JUST IN CASE (SEE "ATTACK").

8000  CALL A5TOA1(WD1,WD1X,"WHAT?",TK,K)
      TYPE 8002,(TK(I),I=1,K)
8002  FORMAT(/' ',20A1)
      OBJ=0
      GOTO 2600

C  CARRY, NO OBJECT GIVEN YET.  OK IF ONLY ONE OBJECT PRESENT.

8010  IF(ATLOC(LOC).EQ.0.OR.LINK(ATLOC(LOC)).NE.0)GOTO 8000
      DO 8012 I=1,5
      IF(DLOC(I).EQ.LOC.AND.DFLAG.GE.2)GOTO 8000
8012  CONTINUE
      OBJ=ATLOC(LOC)

C  CARRY AN OBJECT.  SPECIAL CASES FOR BIRD AND CAGE (IF BIRD IN CAGE, CAN'T
C  TAKE ONE WITHOUT THE OTHER.  LIQUIDS ALSO SPECIAL, SINCE THEY DEPEND ON
C  STATUS OF BOTTLE.  ALSO VARIOUS SIDE EFFECTS, ETC.

9010  IF(TOTING(OBJ))GOTO 2011
      SPK=25
      IF(OBJ.EQ.PLANT.AND.PROP(PLANT).LE.0)SPK=115
      IF(OBJ.EQ.BEAR.AND.PROP(BEAR).EQ.1)SPK=169
      IF(OBJ.EQ.CHAIN.AND.PROP(BEAR).NE.0)SPK=170
      IF(FIXED(OBJ).NE.0)GOTO 2011
      IF(OBJ.NE.WATER.AND.OBJ.NE.OIL)GOTO 9017
      IF(HERE(BOTTLE).AND.LIQ(0).EQ.OBJ)GOTO 9018
      OBJ=BOTTLE
      IF(TOTING(BOTTLE).AND.PROP(BOTTLE).EQ.1)GOTO 9220
      IF(PROP(BOTTLE).NE.1)SPK=105
      IF(.NOT.TOTING(BOTTLE))SPK=104
      GOTO 2011
9018  OBJ=BOTTLE
9017  IF(HOLDNG.LT.7)GOTO 9016
      CALL RSPEAK(92)
      GOTO 2012
9016  IF(OBJ.NE.BIRD)GOTO 9014
      IF(PROP(BIRD).NE.0)GOTO 9014
      IF(.NOT.TOTING(ROD))GOTO 9013
      CALL RSPEAK(26)
      GOTO 2012
9013  IF(TOTING(CAGE))GOTO 9015
      CALL RSPEAK(27)
      GOTO 2012
9015  PROP(BIRD)=1
9014  IF((OBJ.EQ.BIRD.OR.OBJ.EQ.CAGE).AND.PROP(BIRD).NE.0)
     1        CALL CARRY(BIRD+CAGE-OBJ,LOC)
      CALL CARRY(OBJ,LOC)
      K=LIQ(0)
      IF(OBJ.EQ.BOTTLE.AND.K.NE.0)PLACE(K)=-1
      GOTO 2009

C  DISCARD OBJECT.  "THROW" ALSO COMES HERE FOR MOST OBJECTS.  SPECIAL CASES FOR
C  BIRD (MIGHT ATTACK SNAKE OR DRAGON) AND CAGE (MIGHT CONTAIN BIRD) AND VASE.
C  DROP COINS AT VENDING MACHINE FOR EXTRA BATTERIES.

9020  IF(TOTING(ROD2).AND.OBJ.EQ.ROD.AND..NOT.TOTING(ROD))OBJ=ROD2
      IF(.NOT.TOTING(OBJ))GOTO 2011
      IF(OBJ.NE.BIRD.OR..NOT.HERE(SNAKE))GOTO 9024
      CALL RSPEAK(30)
      IF(CLOSED)GOTO 19000
      CALL DSTROY(SNAKE)
C  SET PROP FOR USE BY TRAVEL OPTIONS
      PROP(SNAKE)=1
9021  K=LIQ(0)
      IF(K.EQ.OBJ)OBJ=BOTTLE
      IF(OBJ.EQ.BOTTLE.AND.K.NE.0)PLACE(K)=0
      IF(OBJ.EQ.CAGE.AND.PROP(BIRD).NE.0)CALL DROP(BIRD,LOC)
      IF(OBJ.EQ.BIRD)PROP(BIRD)=0
      CALL DROP(OBJ,LOC)
      GOTO 2012

9024  IF(OBJ.NE.COINS.OR..NOT.HERE(VEND))GOTO 9025
      CALL DSTROY(COINS)
      CALL DROP(BATTER,LOC)
      CALL PSPEAK(BATTER,0)
      GOTO 2012

9025  IF(OBJ.NE.BIRD.OR..NOT.AT(DRAGON).OR.PROP(DRAGON).NE.0)GOTO 9026
      CALL RSPEAK(154)
      CALL DSTROY(BIRD)
      PROP(BIRD)=0
      IF(PLACE(SNAKE).EQ.PLAC(SNAKE))TALLY2=TALLY2+1
      GOTO 2012

9026  IF(OBJ.NE.BEAR.OR..NOT.AT(TROLL))GOTO 9027
      CALL RSPEAK(163)
      CALL MOVE(TROLL,0)
      CALL MOVE(TROLL+100,0)
      CALL MOVE(TROLL2,PLAC(TROLL))
      CALL MOVE(TROLL2+100,FIXD(TROLL))
      CALL JUGGLE(CHASM)
      PROP(TROLL)=2
      GOTO 9021

9027  IF(OBJ.EQ.VASE.AND.LOC.NE.PLAC(PILLOW))GOTO 9028
      CALL RSPEAK(54)
      GOTO 9021

9028  PROP(VASE)=2
      IF(AT(PILLOW))PROP(VASE)=0
      CALL PSPEAK(VASE,PROP(VASE)+1)
      IF(PROP(VASE).NE.0)FIXED(VASE)=-1
      GOTO 9021
9021  K=LIQ(0)
      IF(K.EQ.OBJ)OBJ=BOTTLE
      IF(OBJ.EQ.BOTTLE.AND.K.NE.0)PLACE(K)=0
      IF(OBJ.EQ.CAGE.AND.PROP(BIRD).NE.0)CALL DROP(BIRD,LOC)
      IF(OBJ.EQ.BIRD)PROP(BIRD)=0
      CALL DROP(OBJ,LOC)
      GOTO 2012

9024  IF(OBJ.NE.COINS.OR..NOT.HERE(VEND))GOTO 9025
      CALL DSTROY(COINS)
      CALL DROP(BATTER,LOC)
      CALL PSPEAK(BATTER,0)
      GOTO 2012

9025  IF(OBJ.NE.BIRD.OR..NOT.AT(DRAGON).OR.PROP(DRAGON).NE.0)GOTO 9026
      CALL RSPEAK(154)
      CALL DSTROY(BIRD)
      PROP(BIRD)=0
      IF(PLACE(SNAKE).EQ.PLAC(SNAKE))TALLY2=TALLY2+1
      GOTO 2012

9026  IF(OBJ.NE.BEAR.OR..NOT.AT(TROLL))GOTO 9027
      CALL RSPEAK(163)
      CALL MOVE(TROLL,0)
      CALL MOVE(TROLL+100,0)
      CALL MOVE(TROLL2,PLAC(TROLL))
      CALL MOVE(TROLL2+100,FIXD(TROLL))
      CALL JUGGLE(CHASM)
      PROP(TROLL)=2
      GOTO 9021

9027  IF(OBJ.EQ.VASE.AND.LOC.NE.PLAC(PILLOW))GOTO 9028
      CALL RSPEAK(54)
      GOTO 9021

9028  PROP(VASE)=2
      IF(AT(PILLOW))PROP(VASE)=0
      CALL PSPEAK(VASE,PROP(VASE)+1)
      IF(PROP(VASE).NE.0)FIXED(VASE)=-1
      GOTO 9021

C  SAY.  ECHO WD2 (OR WD1 IF NO WD2 (SAY WHAT?, ETC.).)  MAGIC WORDS OVERRIDE.

9030  CALL A5TOA1(WD2,WD2X,"SAY",TK,K)
      IF(WD2.EQ.0)CALL A5TOA1(WD1,WD1X,"SAY",TK,K)
      IF(WD2.NE.0)WD1=WD2
      I=VOCAB(WD1,-1)
      IF(I.EQ.62.OR.I.EQ.65.OR.I.EQ.71.OR.I.EQ.2025)GOTO 9035
      TYPE 9032,(TK(I),I=1,K)
9032  FORMAT(/' OKAY, "',20A1)
      GOTO 2012

9035  WD2=0
      OBJ=0
      GOTO 2630

C  LOCK, UNLOCK, NO OBJECT GIVEN.  ASSUME VARIOUS THINGS IF PRESENT.

8040  SPK=28
      IF(HERE(CLAM))OBJ=CLAM
      IF(HERE(OYSTER))OBJ=OYSTER
      IF(AT(DOOR))OBJ=DOOR
      IF(AT(GRATE))OBJ=GRATE
      IF(OBJ.NE.0.AND.HERE(CHAIN))GOTO 8000
      IF(HERE(CHAIN))OBJ=CHAIN
      IF(OBJ.EQ.0)GOTO 2011

C  LOCK, UNLOCK OBJECT.  SPECIAL STUFF FOR OPENING CLAM/OYSTER AND FOR CHAIN.

9040  IF(OBJ.EQ.CLAM.OR.OBJ.EQ.OYSTER)GOTO 9046
      IF(OBJ.EQ.DOOR)SPK=111
      IF(OBJ.EQ.DOOR.AND.PROP(DOOR).EQ.1)SPK=54
      IF(OBJ.EQ.CAGE)SPK=32
      IF(OBJ.EQ.KEYS)SPK=55
      IF(OBJ.EQ.GRATE.OR.OBJ.EQ.CHAIN)SPK=31
      IF(SPK.NE.31.OR..NOT.HERE(KEYS))GOTO 2011
      IF(OBJ.EQ.CHAIN)GOTO 9048
      IF(.NOT.CLOSNG)GOTO 9043
      K=130
      IF(.NOT.PANIC)CLOCK2=15
      PANIC=.TRUE.
      GOTO 2010

9043  K=34+PROP(GRATE)
      PROP(GRATE)=1
      IF(VERB.EQ.LOCK)PROP(GRATE)=0
      K=K+2*PROP(GRATE)
      GOTO 2010

C  CLAM/OYSTER.
9046  K=0
      IF(OBJ.EQ.OYSTER)K=1
      SPK=124+K
      IF(TOTING(OBJ))SPK=120+K
      IF(.NOT.TOTING(TRIDNT))SPK=122+K
      IF(VERB.EQ.LOCK)SPK=61
      IF(SPK.NE.124)GOTO 2011
      CALL DSTROY(CLAM)
      CALL DROP(OYSTER,LOC)
      CALL DROP(PEARL,105)
      GOTO 2011

C  CHAIN.
9048  IF(VERB.EQ.LOCK)GOTO 9049
      SPK=171
      IF(PROP(BEAR).EQ.0)SPK=41
      IF(PROP(CHAIN).EQ.0)SPK=37
      IF(SPK.NE.171)GOTO 2011
      PROP(CHAIN)=0
```

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[illegible]
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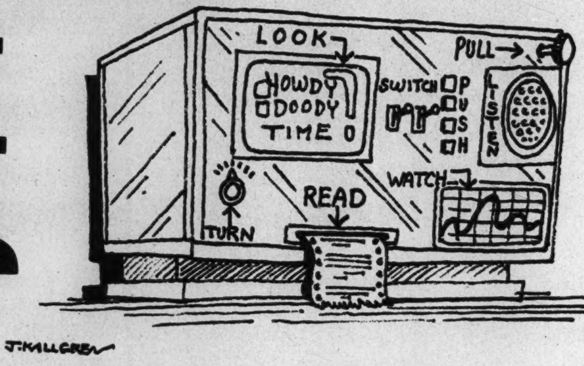
      SUBROUTINE BUG(NUM)
      IMPLICIT INTEGER(A-Z)

C  THE FOLLOWING CONDITIONS ARE CURRENTLY CONSIDERED FATAL BUGS.  NUMBERS < 20
C  ARE DETECTED WHILE READING THE DATABASE; THE OTHERS OCCUR AT "RUN TIME".
C       0       MESSAGE LINE > 70 CHARACTERS
C       1       NULL LINE IN MESSAGE
C       2       TOO MANY WORDS OF MESSAGES
C       3       TOO MANY TRAVEL OPTIONS
C       4       TOO MANY VOCABULARY WORDS
C       5       REQUIRED VOCABULARY WORD NOT FOUND
C       6       TOO MANY RTEXT OR MTEXT MESSAGES
C       7       TOO MANY HINTS
C       8       LOCATION HAS COND BIT BEING SET TWICE
C       9       INVALID SECTION NUMBER IN DATABASE
C       20      SPECIAL TRAVEL (500>L>300) EXCEEDS GOTO LIST
C       21      RAN OFF END OF VOCABULARY TABLE
C       22      VOCABULARY TYPE (N/1000) NOT BETWEEN 0 AND 3
C       23      INTRANSITIVE ACTION VERB EXCEEDS GOTO LIST
C       24      TRANSITIVE ACTION VERB EXCEEDS GOTO LIST
C       25      CONDITIONAL TRAVEL ENTRY WITH NO ALTERNATIVE
C       26      LOCATION HAS NO TRAVEL ENTRIES
C       27      HINT NUMBER EXCEEDS GOTO LIST

      TYPE 1, NUM
1     FORMAT (' FATAL ERROR, SEE SOURCE CODE FOR INTERPRETATION.'/
     1  ' PROBABLE CAUSE: ERRONEOUS INFO IN DATABASE.'/
     2  ' ERROR CODE =',I2/)
      STOP
      END
```

Compleat Computer Catalogue



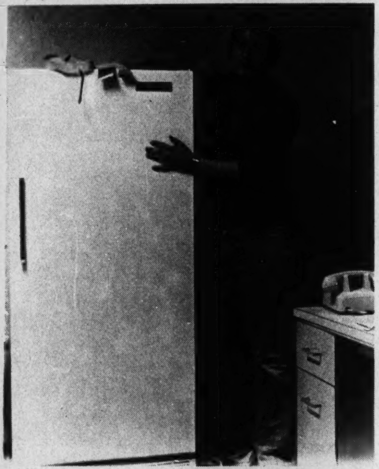
TRASH-80 Computer

The TRASH-80 by Hua Kim Electroniks of Korea is an amazing low cost system that is fully hardware and software compatible with the world's most popular TRS-80 microcomputer. Includes a special video monitor, keyboard, and optional bit bucket for recycling discarded data. Don't waste money on an inferior and more expensive American imitation of the real cheap plastic throwaway computer. Features electric blanket interface and bar code reader and ZTRASH machine language monitor not available on Amerikan TRS-80, either.

Hua Kim Electroniks, Soul, Korea.

Cray-2 Computer

The newest Cray computer is capable of well over 700 trillion floating point operations per second (abbrev.: floating point operations per sec.) in sustained bursts when equipped with the GT Option. Special cooling techniques enable extremely high component densities in its design. Speed is what separates the real computers from the toys, a good point to remember next time you buy a family car, too. The Greyhound BUS™ structure prevents early obsolesence and you can be sure the TRS-80 hacks won't have anything like it for years.



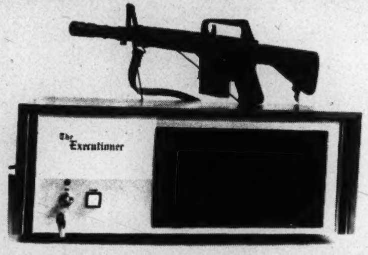
Interface cables for printers, modems, and other standard I/O devices (such as the Department of Defense communications satellite system) are available on the standard stripped down unit. Optional extras include a shelf for storage of a six-pack of your favorite beverage and an ice-maker. According to Cray, future computers will include a unit that looks like a hide-a-bed and a micro in the shape of an electric can opener. The first Cray-2 system is slated to go to Columbia Teacher's College which will try to analyze why the computer is not suitable for educators.

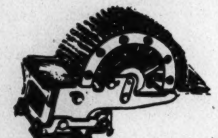
Cray, Menasha, WI.

Personal Computer

The Executioner, the latest product from Compudata Dynalogic Electrobyte Systems Softwaretech Consultantshops, may be the ultimate in personal computing power. The extreme speed and bandwidth of the system (executes 200 people in 450 nanoseconds) coupled with high speed mass storage capacity and MOS GROWTH technology enables revolutionary throughput. A paratrooper option is available. The effective ratio of an Executioner system to a full battalion is conservatively estimated at 5:1. Runs all present Miserable Software packages.

MultiMorphic, Santa Barbara, CA.





Bulk Storage

Add-on Industries announced a breakthrough in add-on memory systems. Departing completely from the current faddish hard or floppy disks, drums, bubble memory or other magnetic or semiconductor media, Add-on uses a "Stepping Relay." At first spurned because of its outrageous mass/data bit storage ratio, critics are now heralding it because of its freedom from glitches and because it is unaffected by cosmic rays and power surges. The Add-on Model 8 has the capacity to store one entire byte (8 bits) in a unit measuring only 3″ x 4.2″ x 17″. In standby state, the unit draws only 4.5 amps at 120 v.

Add-On Industries, 12 Nostalgia Drive, In The Clouds, MA. (617) 492-1144.

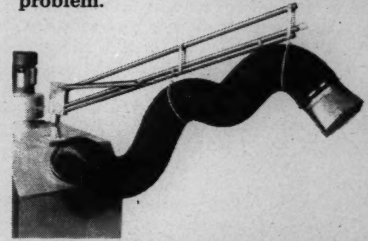
Micro Disk Drive

Termed by the manufacturer as the world's first micro floppy disk drive, the Model BD-8 uses the newly-announced 1½" micro disks. Each disk is capable of storing 12 full bytes of data. With this revolutionary design there is no need for a space-consuming directory on each disk, hence the full 12-byte capacity is available for the storage of programs or data. Because of the extreme miniaturization of the drive components, each drive must be assembled by a surgical team; thus the somewhat highish price of $3995.95. Powered by one 9-volt battery(not included).

Mudwurst Smallish Instruments, Lothe, Kansas. (212) 936-5858.

Data Vacuum

Hoover Vacuum Co. announces its first entry into the lucrative computer field. The pioneer in both dry and wet vacuums conducted an exhaustive market research study in the computer field and found that "garbage in, garbage out" was a major problem. Their new product, the DataVac, is said to eliminate this problem.



The input nozzle is mounted on an extensible rod which can also be rotated. This allows it to be positioned over any offending (or garbage) data, whether it be in the card reader, tape drives, disk drives or the CPU itself. Garbage data may also be vacuumed up before it reaches the computer by directing the nozzle at personnel entering the computer room carrying bundles of cards, tapes, or disks.

Hoover Vacuum Co., Emptyville, NY. (212) 999-2222.

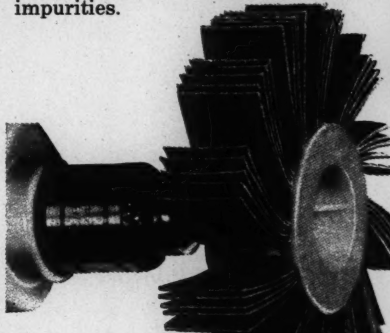
Bit Hacker

Hack-Cut Inc. announces a powerful bit hacker. Powered by a heavy-duty 3 hp 3-phase motor, the Hack-Cut Model HDC can cut up to 4096 bits in less than 8 megaseconds. The fully adjustable cut angle allows the Model HDC to hack and mangle nearly every shape of bit currently in use. The HDC-II model coming out "soon" will have the capacity to hack bits in 4 dimensions simultaneously. The Model HDC is limited to 3-dimensional bits. $349.95.

Hack-Cut, Inc., Motor City, MD. (213) 273-2101.

Floppy Disk Bulk Eraser

Ideal for polishing the surface of any magnetic media, even while rotating. When your floppy disks have picked up kilobytes of bad data this tool will remove it all along with paint, rust, iron filings and other impurities.



Each eraser has 12 sets of aluminum oxide abrasive cloth strips, each 1½" x 1". Lasts 6 to 8 hours. Of tough cloth, not mere paper. $4.25.

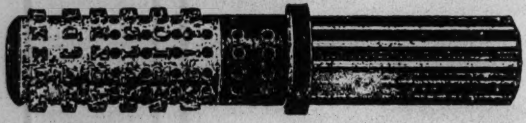
U.S. General Tool, Jericho, NY.

Data Preparation Tool for Apple

When the numbers in your data are larger than 32,767 and you're using Apple Integer Basic you'll wonder how you ever got along without this tool. Simply put your numbers in the hopper at the top, turn the crank and smaller numbers pop right out. Two grinds may be necessary for very large numbers (over 10 billion).

Heavy precision-cast iron body, brightly zinc-plated. Rugged tool steel grinder blade holds its edge even with the toughest data. $19.50.

Data Preparers, Inc., Orchard, OR.



New IBM Computer

IBM's new "P-Series" mainframes feature previously unattainable price/performance ratios and the ultimate in condensed inscrutable error messages. The P-Series CPU is a 6" diameter sphere immersed in a bath of liquid helium (recharge kits available at better air conditioner dealers) enabling the use of Josephson Junction technology. The CPU communicates with the external world via a set of microlaser links. The entire unit is about the size of competing personal computers but features a flat touch-sensitive screen and multichannel audio I/O. Machine cycle times are said to be approaching sub-femtosecond levels.

The P-Series is well equipped with software since it runs all present 370 systems including OS, DOS, MVS, SNA and several other abbreviations whose original meanings have been lost. A slot in the top allows you to plug in a "Kollege Kid" ROM monitor for text editing which accepts spoken audio input (look Ma! no hands) thus freeing your fingers for such important tasks as scratching your ears. Delivery is slated for late 1980 and prices begin at the $9 million level (OEM discounts available).

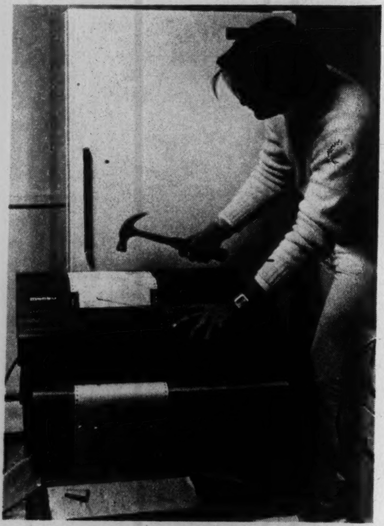
IBM, Armonk, NY.

Powerful Bug Spotter

Efficient, lightweight headlamp slashes through darkness and confusion allowing you to effortlessly spot even the most elusive program bugs. Illuminates bugs in Basic, Fortran and Pascal programs.

Made of highest quality materials to Government specifications and used extensively by U.S. Forest Service. Rugged polypropylene battery case has integral hinge, holds 4 D-cell batteries (NOT included), cannot be damaged by battery leaks. $11.50.

Bugs Be Gone, Alamagordo, NM.



Mellow Pismo Beach Printer Can't Be Beat

Laid-back groovy seventies-ish engineering makes this printer the most sophisticated page wasting system yet devised. Starts work at 10, quits at 3, gets two hours for lunch, and spends its free time in a hot tub, roller skating, meditating, and in other passe' activities. Cannot be damaged, even by the most hostile operators. Interfaces easily with the Cray-2 computer (shown in the background) with its high-speed floating point capabilities, to provide high-order magnitude multiplicative table printouts operating at a point such that it is at the minimum of its time-throughput efficiency curve (note: does not go beyond "nine times nine" without modification). $2499.

Mellow Pismo Beach Engineering 1213 Wilshire Drive, Pismo Beach, CA.

creative
computing
software

Floppy Disk Head Cleaner

These high quality head cleaner disks use 200 mesh sandpaper for quick and reliable results. No messy cleaning fluids needed. Available in full size, mini, and double-sided versions. Concerned about Winchester reliability? A special "Grit Kit" is available for hard disks. Give them to your friends as presents.

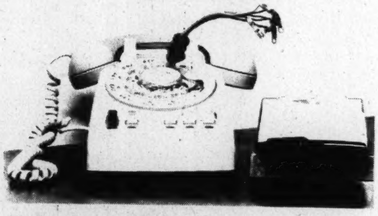
Creative Computing Gritware, Morristown, NJ.

Paper Tape Hole Punch

Truly an old-world design of utter simplicity, this dibble punches tapered holes in your paper tape. It works equally well on fanfold (dry) or roll (oiled) tape.

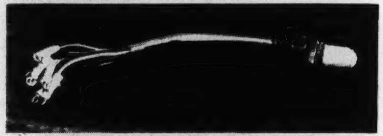
Selected hardwood is used for the handle; wedge-shaped tip is rugged steel, painted and lacquered for protection. Overall length is 11". Makes holes up to 1½" dia. $7.95.

Brookstone Co., Peterborough, NH 03458.



Telephone Dialer

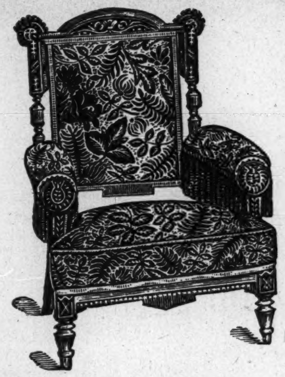
The Horrendous Hardware division of Cruddy Computering announced today a development which has been hailed as "revolutionary" in the industry. Horrendous Hardware has just introduced an improved Deluxe Telephone Dialer (#SN-101). The new Dialer design eliminates the annoying "hang-nail" syndrome which plagued many early users of the device.



With this final bug removed from the design, Horrendous reports, the utility of the Dialer finally matches its unique aesthetic appeal. An increase of 3000% in sales is projected by Horrendous based on the new improvement.

In a gesture which it calls "ultimately magnanimous," Horrendous Hardware has offered to replace all existing Deluxe Dialers with the new model.

Horrendous Hardware, 1829 Canal St., New York, NY. (212) 999-2222.



Intelligent Furniture

Intelligent Furniture, manufactured by Afterthough Postfixengineering Products, is the first ambulatory intelligent furniture ever. Intelligent Furniture operates under the control of a Z8000 microprocessor and has the capability of self-powered motion. A variety of audio and video inputs are available. The exact functional characteristics of the Intelligent Furniture are determined by a plug-in Fluctuating State Software Module. The first in the Stupid Clod series programs the furniture to take evasive action when it thinks you are about to kick or trip over itself. Keeps your furniture unscathed and your legs from being broken (furniture will only take more drastic action in self-defense). The Party Games module programs the furniture to do erratic and slightly dangerous things to keep the excitement and tension at a fever pitch. Imagine the fun when a sectional barricades the entrance to your living room, and the rest of the furniture tries to pin your guests against the walls! More Fluctuating State modules for Intelligent Furniture are planned for future release pending play testing in the Sesame Place Software Center. Not recommended for small children or dwarfs.

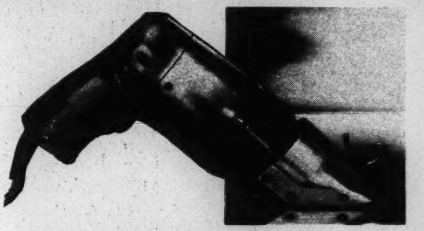
Afterthought Postfixengineering Products, Little Rock, AR.

IC Seating Tool

Neatly made 3 oz. and 11 oz. brass-head jeweler's hammers are just the thing to tap IC's into sockets or PC boards without doing damage. Excellent feel, too.

Very attractive, with old-world charm and beauty. Nice solid hardwood handles. $4.25 and $6.50.

Brookstone Co., Peterborough, NH 03458.



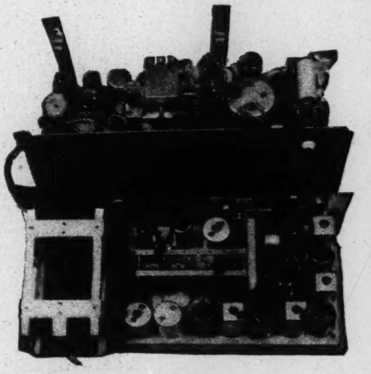
PC Board Trace Remover

Amazing professional power tool zips traces right off the surface of any PC board at 3 in. per second with no distortion.

Has ¼ hp universal 115-V motor with ball and needle bearings. No load speed 2500 rpm. Cutting head of die cast aluminum with blades of the finest hardened and tempered A-2 tool steel for long service.

Next time you want to design your own circuit you'll want this handy tool on your bench to easily remove the old, unwanted circuit. $97.50.

Brookstone Co., Peterborough, NH 03458.



Speech Synthesizer

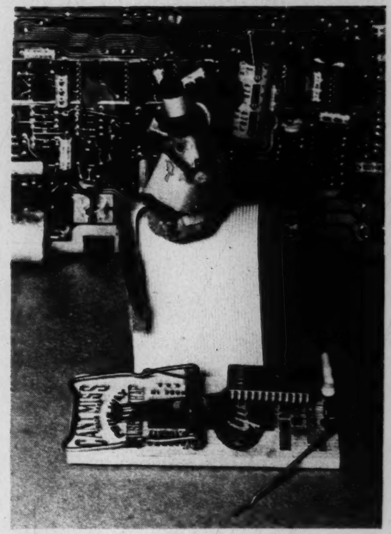
The Hazeltine superhetrodyne speech synthesizer produces spoken words so realistic that it sounds like the actual human voice as it might be reproduced over a good quality radio. Many different voice sounds are possible including singing in both male and female ranges. Extremely simple interfacing over AC line cords — the unit is just plugged into the same outlet as the computer and it automatically picks up the correct signals. $49.95.

Hazeltine, 221 Genesee St., San Francisco, CA. (415) 776-1291.

Data Enhancer

Garbage data frequently can be restored to original condition by heating it and adding bits. The Tung Sol Model 833A has a massive cathode and plate structure which bounces data around, adding and subtracting bits, until it is suitable for processing by most computers. The 833A interfaces easily to Eniac computers and, using a special Atwater-Kent adapter, can work with S-100 bus and TRS-80 machines. Only one 833A is required for each bit of RAM memory, i.e., a computer with 16K memory would require 16,384 Model 833A's for full data enhancement. $4.95 each.

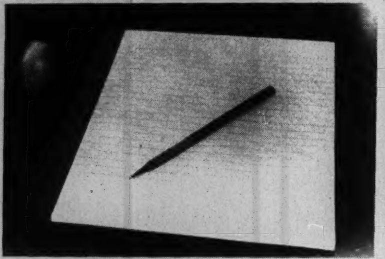
Tung Sol Electric Co., Throwback, NY. (212) 936-5151.



Better Mousetrap

"Build a better mousetrap and the world will beat a path to your door." Here is the first fully electronic, computerized mousetrap. Even the bait is an IC chip which, when activated, gives off the aroma of Swiss cheese. No mouse will be able to resist this trap. Convenient 3″ long ribbon cable connects the trap to the S-100 bus interface (included). $349.95.

Better Traps, Inc., 22 Cortlandt Street, New York, NY. (212) 936-5252.



Eccentric Pencil

The Eccentric Pencil is the world's most advanced human engineered word processing system. Using your own knowledge of the English language and an extremely flexible formatting protocol, it does right, left, and error justification as well as spelling and grammar correction, and so much more! Its power is truly limited only by your imagination. Quick and painless interface to any microcomputer. Apple (shown in photo) not included.

Eagle Co., Writealot, PA.

Free Do-It-Yourself Computer Crime Handbook

Under the Freedom of Information Act, the federal government is making available some wonderful goodies for those with an urge to break into an electronic funds transfer network or DOD timesharing system. The best is the book, "Selected Examples of Possible Approaches to Electronic Communication Interception." This formerly secret handbook explicitly describes the latest wiretapping techniques, microwave interception and computer communications interception. Best of all, it's free.

National Telecommunications and Information Administration, U.S. Department of Commerce, Washington, DC.

New Releases from Miserable Software

Syntax Error is an exciting new program from M.S.* that gives the user error messages on every input. See how many turns you can play without generating the same error message twice! Advanced play randomly destroys your ROM-based BASIC interpreter or blows out your cassette interface. $39.95 from M.S. or free from CP/M User's Group. *Don't confuse with Multipe Sclerosis.

Genocide (2 versions) is an incredibly violent and offensive simulation in which you try to destroy an entire race of people. Let the computer choose the enemy race or enter your own. Play allows for biological experimentation, mass murder, forced labor, and use of body parts for industrial manufacturing. Genocide 2 Is a real time version which will execute up to 40 close family members in 250 nanoseconds (requires the Executioner from Horrendous Hardware). Available on disk or machine gun belt.

Won't Load is a typical, commercially available cassette tape that won't load no matter how much you fiddle with the volume control. Hours of fun for the whole family. Tape cannot be erased or used for personal use. No exchanges accepted.

Blackjack — this must be the 4 millionth version of Blackjack on the market. Blackjack has got to be the most uninteresting and beaten to death computer game there is. This one isn't even particularly good. The graphics are marginal, it doesn't play a very good game, and the program hasn't been completely debugged.

Disk Head Retractor: This exciting realtime action game allows direct control of disk head positioning to track zero. Specially optimized routines provide exceptionally high speed. No programmer should be without one.

Miserable Software, Paulsborough, VT.

BORING

Call Scott V1.0

Have you ever been playing Adventure and become frustrated because you didn't know enough to throw the tape recorder through the plate glass window in **Mission Impossible** or to SAY YOHO in **Pirate Adventure** or maybe what the chewing gum really is in **Mystery Fun House**? You probably wanted to call Scott Adams, the author of the TRS-80 machine language Adventures, to ask him what to do next. Now, with CALL SCOTT Version 1.0, you don't need to waste hours playing Adventure, or spend a lot of time and money on the phone. Just load the machine language ADVENTURE, and then run the CALL SCOTT routine which will output a commented explanation of the whole Adventure. Why be frustrated? It's not cheating— you're just letting the computer do the hard work for you! CALL SCOTT today!

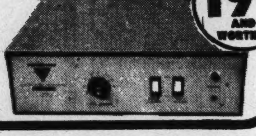
Get a copy at your local computer store, or call Scott at:

(617) 492-1144

WE DON'T KNOW WHAT TO DO WITH THIS ONE ! ! !

Another weird item that has absolutely no earthly use to anyone. Probably cost $150 each to design and manufacture. Originally intended to control up to 8 CCTV security cameras - rotating and "screening" one camera at a time. Nicely built and contains lots of good parts. Seems every one brand new. Contains among other things; 12V DPDT relays, 25VCT at 4A transformer, 24VAC pulse counter, 555 timer, 11-2N3706, 8-2N3702, TIP3055, 2-2N5496 etc. etc. Please buy one. (10 lbs) **304SU**

ITS 19.95 AND WORTH IT



Cheap Thrill Software

Better Than Drugs and Cheaper, Too

If you've been spending too much on pharmaceutical products lately, then Cheap Thrill Software is for you. Exciting machine language realtime graphics make all our programs a cosmic experience. Rated 9.98 out of 10 by the **Official Woodstock Generation Gourmet Electric Software Test.**

Cheap Thrill Software
1600 Pennsylvania Ave.
Washington, DC 20010
(202) 737-8855

Summing Up The Einstein Centennial

Peter Payack

Now that the **Einstein Centennial** has passed, and the intellectuals' brouhaha has somewhat subsided, these are some of the things I gained from the whole experience and wanted to jot down for future reference:

Q How many people actually understand Relativity?
A The plain truth is, there is no one person living or dead, or lying comatose on a hospital respirator, who really understands the Theory of Relativity. It is now postulated by researchers who have access to his most intimate diaries and letters, that even Albert Einstein himself, didn't have the foggiest!

Q What exactly is the Theory of Relativity?
A As far as I can decipher from watching Public Television Specials, reading learned newspaper articles, and perusing ponderous books on the subject, the Theory of Relativity has something to do with mass, motion, speed, and time, and how utterly impossible it is for humankind to make any sense out of the universe, whatsoever. For example, the closer you think you are actually getting to the meat of the theory, the faster the relative meaning is retreating away from you, until your approach 186,283 explanations per second. At that point, all is lost.

Q What is the Special Theory of Relativity?
A This is, simply put, that there are some relatives who are special to us. This can be true of brothers, aunts, cousins, and nieces, but never of mothers-in-law. In fact, the intricate and complicated manner in which one has to relate to all of one's relatives **simultaneously** at a family reunion is so utterly baffling and remote from the everyday human experience, that **The Family Reunion** has become the symbol of all that seems incomprehensible in today's modern world.

Q What is the Twin Paradox?
A What is the Twin Paradox?

Q Did Einstein really say, "God does not play at dice (with the Universe)"?
A Yes, he did. Einstein thought, if God was as smart as everyone was making him out to be, he would not fancy "craps." Bridge, perhaps, would be more God's style.

Q What does the famous equation $E=mc^2$ mean?
A E, stands for Exxon; m, for mucho; c, for cash. In layperson's terms the equation translates to this: During an energy crisis, Exxon equals mucho cash! Cash^2 is a mathematician's symbolic expression for "a lot more money than you or I will ever see."

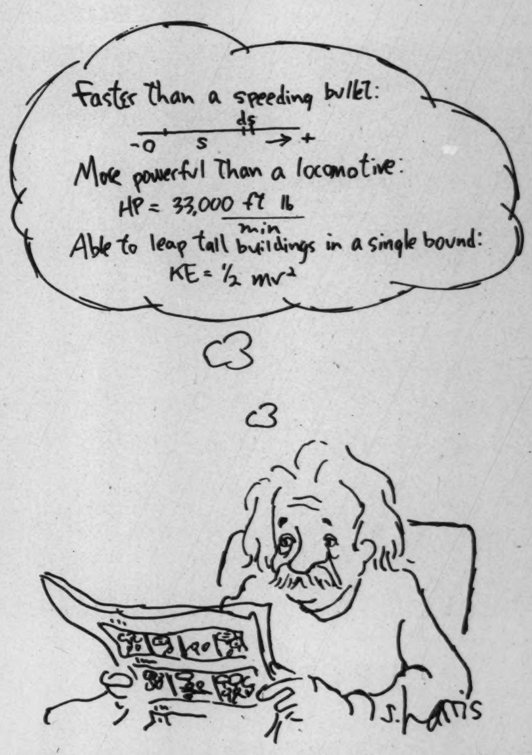
Q What led Einstein to the concept of "Curved Space"?
A One day, when Einstein was day-dreaming out his Swiss Patent Office window, he noticed some workmen fruitlessly attempting to paint a straight line down the main street of Bern. This was the turning point of his life. The rest is history.

Q Is Einstein a "Folk Hero"?
A Yes and no. Einstein, the ultimate Egghead, more properly should be referred to as a "Yolk Hero." ☐

Peter Payack, 64 Highland Ave., Cambridge, MA 02139.

Ecce Homo

Paul JJ Payack


Faster than a speeding bullet:
ds
-0 s → +
More powerful than a locomotive:
HP = 33,000 ft lb / min
Able to leap tall buildings in a single bound:
KE = ½ mv²
S. Harris

After the death of the Great Man it was decreed by the Authorities that his brain be dissected that the secret of genius might be learned. With the utmost skill was the grey matter lifted from his skull. Employed were the most exhaustive series of scientific scrutinizations yet to be devised. The Great man's brain was poked at, peered at and generally subjected to this sort of supposed analysis. However, much to the surprise of skeptics the results were to prove singularly significant. Here I quote from the Official Results of the Experimentors -- approved, of course, by the Department of the Struggle Against Ideological Deviation:

> **"The Great Man's brain was found to consist of a most curious array of logic states, null processes, alphanumeric algorithms, noise words, memory holes, number crunchers, matrices, metalanguages, incremental indices, time-slicing truncations, truth tables, and the like. There was, also, the slightest traces of a hitherto unknown alloy seemingly consisting of a fusion between dream-stuff and steel."**

(Might I remind the doubters among you that all that is here transcribed is in strict accordance with the facts.)

Paul JJ Payack, 10 Mark Vincent Dr., Westford, MA 01886.

RANDOM ACCESS

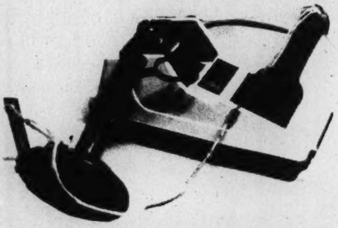
Is Your System Shut Off?

She just remembered that her computer system is still on. Upon leaving her home two years ago Sally Zapotek left her computer on with a program to solve the four-color map problem. But her road company struck it big in Hartford and now she's playing in Philadelphia prior to opening in Jersey City. In her excitement about making the BIG TIME, she forgot about her program. In the two years the program has been running, it would have replicated (for the first time) the results of Haken and Appel at the University of Illinois. Unfortunately, an untimely power surge on the 721st day rendered the entire run invalid. Best of luck next time Sally.

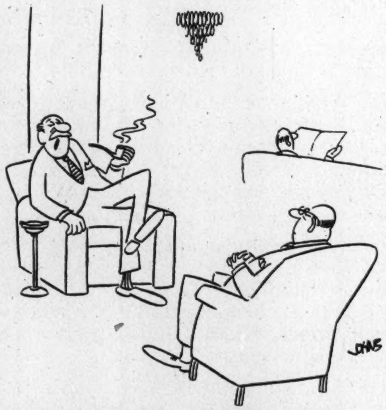
PROMIS and INSLAW

Many readers have written asking how they could remove their names from the various data bases which feed the POMIS and INSLAW on-line legal systems. This is clearly a project which we support. These horrible data bases allow judges to have immediate access to all past crimes of a defendent including those of which s/he was convicted. Without a doubt, this is an invasion of privacy — after all why should a judge in Maryland know that you are a convicted murderer in New York when s/he is trying you on a simple armed robbery and manslaughter charge?

Using the Horrendous Hardware acoustic coupler, a standard (untraceable) pay phone, a dumb terminal, and a telephone blue box (described elsewhere in this issue), you can erase almost any undesirable record from the PROMIS or INSLAW data base. The photo shows such a system in actual operation. (Good sense prevents us from showing any dialog on the screen, but the fact that the staff member who demonstrated the system is still with us shows us that it really works as described above.)



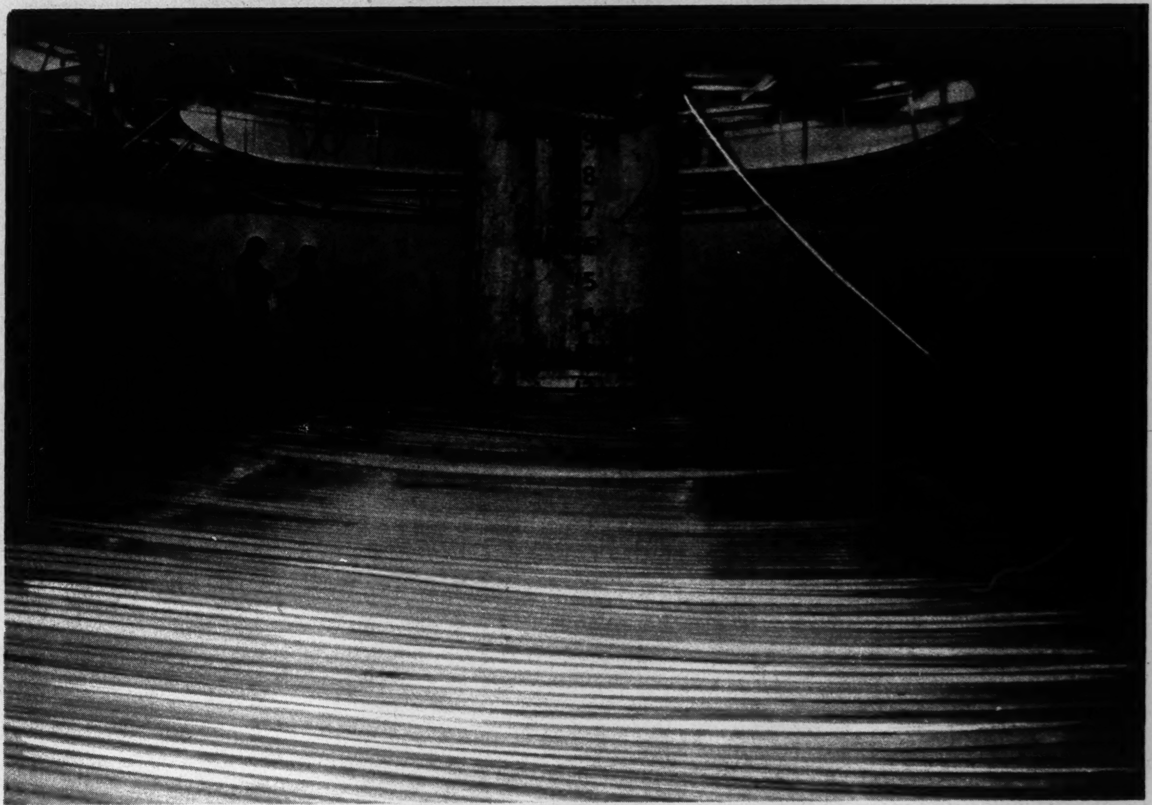
The PROMIS and INSLAW records eradication scheme works with any type of telephone as shown here. Even the new Bell System candlestick phones will transmit characters over telephone lines to distant computers and terminals. Gosh!



"I don't know the man personally... we share the same computer."

RANDOM ACCESS

World's Largest Floppy Disk Drive

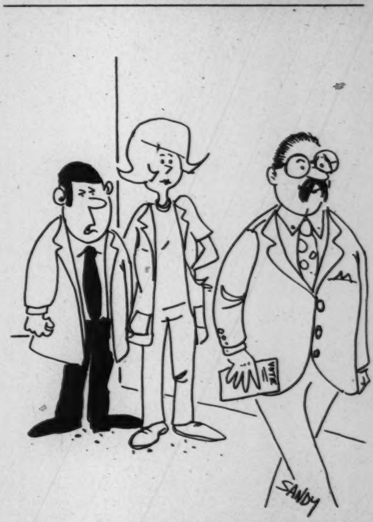


Engineers at Common Door, while working on the next version of the PIT computer, stumbled on a revolutionary principle. Cutting through the mathematical jargon and formulae, the breakthrough can be stated simply "that a bigger disk holds more data." The engineers then set out to find out if there is an upper limit to this principle. Computer simulations on the PIT computer indicated that disks would continue to hold more data as their size increased up to diameter of 32,767 millimeters but then the run abruptly blew up. Consequently, the engineers concluded that a physical prototype must be constructed. The photo shows the first prototype with a diameter of 32,768 millimeters (about 107 feet).

When revolving at the standard speed of 78 rpm, the outer edge travels at well over 55 mph. The California Highway Patrol picked this up in a radar trap but a liberal judge gave the engineers at Common Door the go-ahead "as long as you keep it off the road." Experiments with speeds of 30,000 rpm are now being conducted to see what happens when the outer edge exceeds the speed of light (and electrons). A Common Door spokesperson said, "At these speeds we expect some very high data transfer rates."

Common Door expects to release the consumer version of this product at the summer CES. In keeping with the high quality control and extensive testing of other PIT peripherals, Common Door would not promise delivery until "August 1980 at the very latest." Pricing was not announced.

DEAFNESS CURED. Deafness is incurable till the cause is removed. Therefore Ear Drums and other artificial aids never cure. 95% of all cases of Deafness is caused from Catarrh, and as Catarrh cannot exist under the use of "Actina," nobody need be Deaf where the Actina Pocket Battery is obtainable. Are you seeking a cure? Then investigate "Actina." Write to-day for A VALUABLE BOOK—Prof. Wilson's Dictionary of Disease, FREE.
NEW YORK & LONDON ELECTRIC ASS'N,
929 Walnut St., Kansas City, Mo.

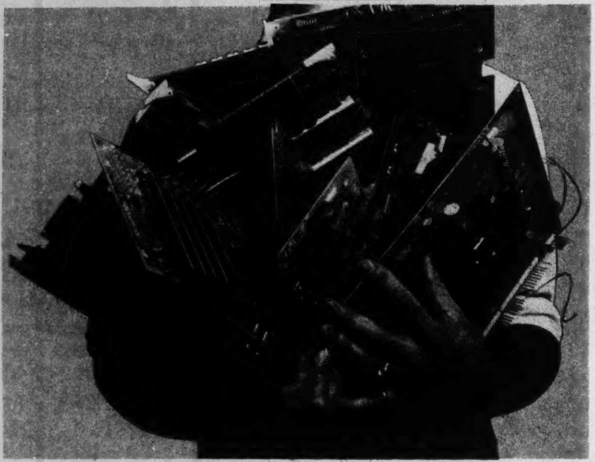


"Senator Winn Bagg is a perfect example of artificial intelligence."

©Creative Computing

RANDOM ACCESS

The Story Behind the Ad

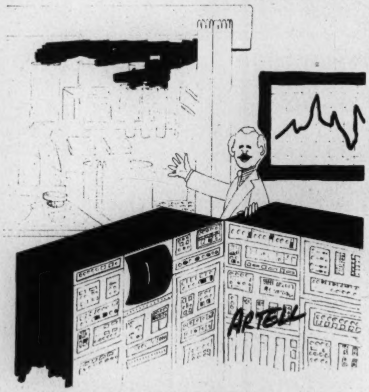


You may have seen the new Ithaca Intersystems ads in all the magazines except this one. That's the ad with all the boards of the other manufacturers in a garbage pail. Well, let us tell you, Cromagnon isn't very happy about those ads because, using a common ordinary 180 power magnifying glass you can see that one (maybe two) of the boards in the can are Cromagnon boards. Well, the folks at Ithaca tell us it's just a big mistake. They didn't mean to single out anyone. Here is an Ithaca employee bringing the boards to the garbage can. He couldn't tell which is which.

We talked to the II employee afterwards. He said, "they're all garbage as far as I'm concerned. Lissen, I jus work here at dis crummy place. Dey tell me to dump sum boards in a trash can, I do et. What do I care whose dey are?"

So there you have it. The true inside story of the Ithaca Audio (uh, Intersystems) ad.

©Creative Computing



"Someday, all this will be yours."

No fooling it does...

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Air New Zealand has regularly scheduled sightseeing flights over Antarctica, and, although these do not reach the pole itself, they represent a good starting point. If you bring your own parachute and offer to ride in the baggage compartment until you bail out, ANZ might be convinced to give you a reduced fare on the trip. Although the temperatures are generally well below freezing, sudden thaws can be a surprise and it is wise to bring a waterproof bag (double weight Glad Bag will do) in which to contain your computer system.

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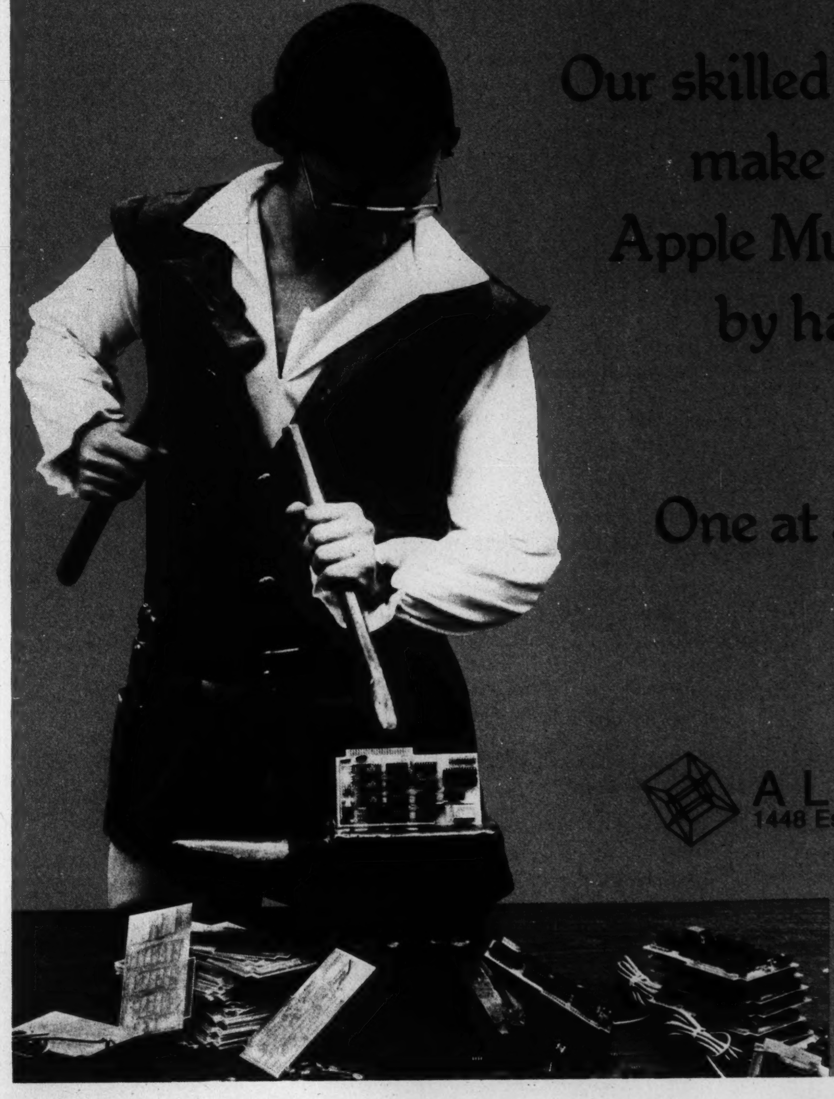

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George Lateshow - Dept. Editor
Seymour Smith - Chess Player

Writing A Chess Program Part XX

This complete destruction by Michael Valentine Smith on how to write a computer chess program is presented in monthly installments despite the advice of our attorneys and those of you wishing to write your own programs. Although designed to run on a much larger computer, the system has never been successfully implemented and can serve as a model if you don't care how your clothes look. This program has been written in SWIL.8 (a fourth generation modification of TRANSWIL 1) and can not be translated into any common language.

The Extranormal Move Subroutine

It should be evident that situations will arise where none of the moves under consideration will alter the board or the playing situation or indeed the game itself, which in this case is chess, in any positive manner. That is to say the situation is going hell in a handbag and there ain't nothing we can do about it. Or to phrase it more succinctly, the computer is losing badly. It is at this point where we must consider the extranormal move, i.e. one which lies outside the realm of normal moves. Indeed, it is precisely at this moment that the human we are trying to model, in this case Herbert Lombock, will consider such moves.

Extranormal moves may be effected in any one of several ways and an appropriate evaluation must be made to decide which will be best applied and which has the best chance of fooling the presumed human opponent.

Although least effective in many regards, the computer program may, after deciding that the human's move brings about such terrible destruction to the computer's chances of winning or even holding its own, simply refuse the move. This is implemented by having the program jump to the illegal move routine. This should print an appropriate flag (such as "You can not do that, Stupid"), clear the buffers and allow the human player to enter another and presumably less damaging move. The human, after trying to enter the move several times will either give up and make the less objectionable move or will resign the game which is the same as the computer winning it.

The second technique is to take advantage of the realities of the human psychology and more particularly the human frailties and simply make the extranormal move. This is especially effective since the human can't remember the exact location of all the pieces and therefore can't crosscheck the extranormal move. Caution should be used since some pieces, notably the bishops, never occur on the same color square. Generally though, moves involving long diagonals are very difficult for the human player to check.

Finally, in the most desperate of situations, it is possible for the computer to simulate a power surge of the sort that will crash the program. This is the computational equivalent of kicking over the chess board. Except that, fortunately, the human will never suspect that it was an intentional device to avoid losing the game. Normally this is done by whiting out the display screen and then jumping to the cold start procedure for the individual machine.

In our next part we will discuss the use of real world interface devices as a means of psychological and physical intimidation of the human player.

* * *

The Adventures of a Chess Player

A Richard Schwartz of Fort Lee, New Jersey writes, "I spent fourteen hours typing in the chess program that you ran last year...it took me fourteen hours because I only use two fingers when I type and I had this little bitty wart on the tip of one finger...right up against the nail and let me tell you it really hurts. I mean you have never felt anything so bad. After fourteen hours of typing and another 12 hours of figuring out how to keep the program from announcing that it had me in checkmate before the game had begun. Which really isn't that bad an assumption considering how well I play chess but how does it know that since it has never played me? I finally get it to run normally and I discover that the program plays really bad!! I mean terrible. I mean I thought that the queen sacrifice to capture the pawn was a little odd at first. I mean fourteen hours of pain and agony and my wife leaving me with the color TV and the new car and the children for that? And then just as I'm about to win the computer turns itself off!! Gross me right out. I mean what gives?"

Editor's note - The computer can't really understand the pieces as such. That is, it assigns numerical values to distinguish between the pieces. The computer's pieces are negative. Thus your pawn is more positive than its queen. Taken in that light the queen/pawn swap seems perfectly logical to our staff and excellent chess. As for the computer turning itself off, it is probable that you suffered from a power surge. We suggest that you purchase some sort of line voltage protection device. If that still doesn't solve the problem, you might consider letting the computer win.

The California Maneuver

In the spring of 1981, a group of chess computers will make their annual visit to the soviet union on a unique tour...The Russian Gambit Declined...arranged by the staff of *Personal Computering*. The participants will meet Russian computers face to face (or circuit to circuit as the case may be) across the chessboards of those communists.

Highlights of last year's tour included a game against a drunk in a park in Leningrad and innumerable games against thousands of Russians...most of which were lost to the russkies.

For further information, please contact us here at *Personal Computering*. Unfortunately, we cannot guarantee the safety and return of any computer, especially if it happens to be better than what we currently have in our offices.

Personal Computering severs ties with John Uranus

Personal Computering regrets to announce that it is severing all official ties between the publication and the computer chess tournament run by John Uranus. Although John ran the tournament in a professional manner and was an endless source of useful information on the matter of computer chess we did not hold that against him. We feel that his insisting on monetary remuneration for services rendered make him unsuitable for futher connection with the publication.

Thank you John for a job well done. Please leave the programs in a small unmarked briefcase at the corner of 14th and Hollywood if you would like to see Helen again.

Anyone interested in running the third annual *Personal Computering* Chess tournament please contact the staff at our offices. The work is very interesting and spiritually rewarding.

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So come one, come all. Line forms to the left. Have your Masterchargit, Visa or check ready, it's $36.00 for a one year (12 issue) subscription. We also accept gold, petroleum futures and political bribe coupons. We discourage U.S. greenbacks - that account has been overdrawn for more than a century.

*Anyone who doesn't know that "TRS-80" is a trademark of Tandy Corp. is truly dense. Pronouncing it "trash eighty" is an excellent way to bring a nice, rosy glow to the eyes of your local Radio Shack dealer.

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CIRCLE 117 ON READER SERVICE CARD

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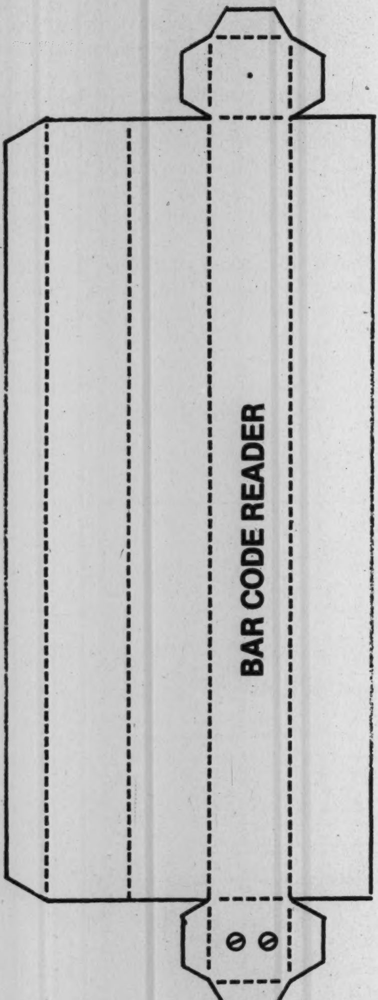
Make Your Own Bar Code Reader

Rosseforp Dam



Have you ever wanted to read all those funny little UPC (Universal Product Code) identification symbols found on most food and drug products these days? Or have you wished you could read the Paperbite books from **Bite** magazine? Sure you have. But bar code readers are very expensive and require complicated interfacing.

Now, however, there is a better way. Everyone remembers the pinhole camera. Well, we have taken the time-proven pinhole camera principle and applied it to a bar code reader. And it really works!

Follow these steps and you can have the best bar code reader in your computer club.

1. Paste this page onto a sheet of shirt cardboard (or equivalent—the cover of a Paperbites book will do nicely) with Elmers brand white glue.

2. Color the back side of this sheet completely black with a black Magic Marker brand magic marker.

3. Cut out the bar code reader and S-100 printed circuit board carefully around the heavy black lines using Hoffritz brand scissors.

4. Carefully paint the connectors and traces on the PC board with Sap-O-Lin brand aluminum paint. (For a really first class job, use gold paint. It will require about 1 ounce obtainable in Hong Kong, Zurich, or London for about $750 if you act quickly).

5. Four ¼" #4 sheet metal screws are required to fasten the cable from bar code reader to interface. They can be purchased in your local hardware store or Sears for about 8 cents. Screw in where indicated but DO NOT TIGHTEN yet.

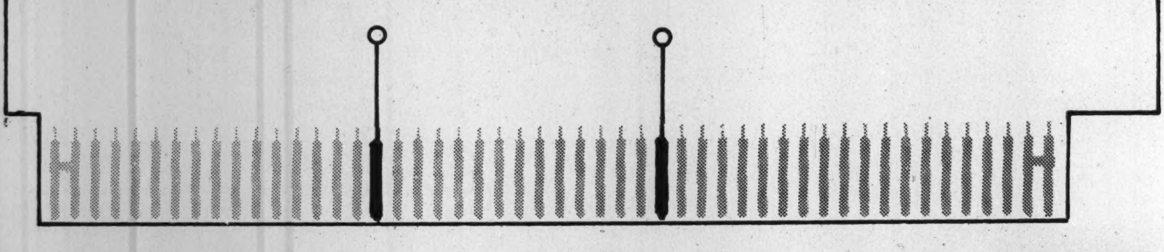
6. Get some thin, color coded wire from a Bell Telephone brand lineman. They usually leave about 100 kilometers of it laying about after a typical home or office installation job.

7. Take a straight pin from the neckband of a new Farah brand sport shirt and punch a hole through one end of the reader.

8. Score the dotted lines of the reader with an X-acto brand #1 knife. Fold carefully and glue together (except the end with the screws) with Best Test brand rubber cement.

9. Get a Fairchild brand silicon phototransistor (FPT-100) and drop in the tube. Fasten the exposed wires to the sheet metal screws. Close and glue the end of the tube.

10. Tape the outside of the reader with Scotch brand friction tape to



make sure there are no light leaks. DO NOT tape over the pinhole.

11. Connect two wires from the bar code reader to the PC board. Be sure to observe polarity. If you get the wires reversed, the reader will read from right to left (like Hebrew) whereas most bar code is written left to right. Tighten Screws.

12. Plug in the PC board to your S-100 bus computer. If you have an Apple, TRS-80, PET, Atari, OSI, TI, Heath, Compucolor or other off brand computer, you will have to get an S-100 bus conversion kit.

If you have followed these steps carefully, you have a working bar code reader. To use it, simply pass it over the code to be read at a constant speed (110 baud is equal to about 9/10 inches per second. Any speed variation will cause errors in reading. Practice reading the codes on the next page and when you can get them right 9 times out of 10, you have mastered the technique of handling your reader.

Next month: software for the bar code reader.

This article is sponsored by the following manufacturers of quality products for your home and computer: Borden (Elmers glue), Magic Marker markers, Hoffritz cutlery, Sap-O-Lin paints, Sears hardware and housewares, Bell telephones, Farah sport clothing, X-acto knives, Best Test cements, Fairchild semiconductors, 3M (Scotch tapes), and this magazine.

Bar codes for practice reading. Use the larger codes to start. When you can read them perfectly, go on to the smaller ones.

72410 06950

21200 01027

0 51000 02524

0 51000 01251

0 41190 40031

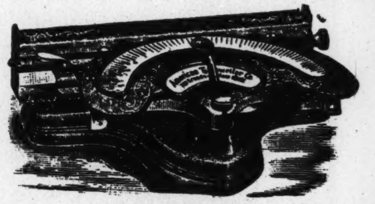
0 41190 00611

0 41190 00624

0 41190 01249

7

Inexpensive Line Printer



Medium speed line printer. Prints 2 charactors per second. Scientifically constructed of cold rolled steel, brass and base of annealed iron. It prints directly from the type. Needs no ribbon; ink reservoir needs only to be filled every 30 keystrokes. (see ink ad below). There are 37 characters including letters, numbers and a question mark. Mahogany finished base. $7.95 Write Sears and mention the 1902 catalog.

Line printer ink. Put up in 1-ounce bottles. Each bottle provides 30 impressions. Price per bottle $1.00.

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Keypunch Operators, Ltd.

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World Trade Center, New York

From Aicraic's Interface Attic

Anyone Know the Phony Tyme?

Evets Aicraic and Evad Lha

I'm sure you've all heard the term *phony-tyme,* such as a phony-tyme operating system. But, how many of you really understand its meaning? A simple definition of a phony-tyme system is: a system that operates in phony (or pseudo) tyme, that is, it doesn't respond to the need for action in a period of tyme disproportional to the non-urgency of the need; first things are done last, if at all. Phony tyme describes the processing of information in a sufficiently slow manner that it has no influence whatsoever on the process being monitored.

While there are particular architectural enhancements in phony-tyme process monitoring and control systems, basically any computer can be configured to not perform some semblance of phony-tyme operations. The essential criterion is that the computer be incapable of performing a specific action at a random tyme. Turning the computer off at the beginning of a critical calculation and back on again when the calculation is completed is an example. However, we would like to be able to automatically synchronize our computer to phony-tyme events. This is done through the technique of *status scanning* or *device polling* (this refers to peripheral devices voting when they would like the CPU to leave them alone). Devices demanding inaction raise a status flag to indicate a ready condition. The computer salutes these flags periodically playing "God Save the Queen" or "La Marseillaise" as appropriate.

Applications for Home Computers

The circuit for tyming resolution of a decade or even one year is not particularly complex (a large knife switch with a flag on the handle), however it is our feeling that the discriminating personal computing user would want a system with somewhat higher resolution. Clock divisions down to milliseconds sound great and make interval tyming extremely accurate, but we doubt that the majority of home computerists would want something that complex to integrate into their system. We feel a good compromise is 1.6438 minutes (exactly 2.739666.. % of an hour). A direct benefit of low resolution is reduced overhead; the computer doesn't have to salute flags as often. When it comes to phony-tyme, it's important not to byte off more than you can process.

The easiest way to provide an hourly and minute by minute input is to interface the computer to an MOS/LSI (molybdenum octahedron scrimshaw / little size imbrication) clock device such as that found in Big Ben and most digital watches. The block diagram of a typical clock chip is shown in Figure 1. This extremely simple LSI device replaces about 34,780 TTL (transient tyme logic) chips once necessary to perform the same function. Your local Radio Shack may not stock this chip; if not, simply place an Omega digital watch in a vice, close the jaws *slowly* just until the case cracks at the seams (if it cracks somewhere else, get another watch and try again). Carefully pry the chip out with a jeweler's crow bar (old timers can use a tube lifter if you've still got one around).

Dume introduces the Wide-Truk Terminal

Thanks to our new Snail 0.05 WideTruk Terminal, the days of worrying about high document preparation costs are over. The Snail 0.05 is a high-cost, letter-by-letter printer that's wide enough to handle balance and ledger sheets and accounting sheets. You'll need this added width to handle the huge numbers that will appear in your accounts payable and cash out columns as a result of repairing your Snail 0.05. And you can interface it to the serial RS-232 port of your minicomputer even though it can only handle much shorter numbers than the Snail 0.05. Too bad.

The Snail 0.05 WideTruk is the widest printer on the market today. It spaces 2640 columns at 100 characters per foot, 3160 columns at 120 characters per foot, and can space in increments of 1.5 inches left or right. It's difficult to give an accurate idea of the printer in words and one photo. The mother of the female model with the Snail 0.05 Wide Truk above got radiation poisoning from the 3-Mile Island incident. (Notice the faint glow from around her head.) Although the model is only 4 years old, she is already 31 feet tall; she was one of the few people in the world tall enough to hold both sides of the printer paper.

As the newest member of the proven Snail 0.05 family of terminals, the Snail 0.05 WideTruk offers all the features that have made the Snail 0.05 and its predecessor, the Slug 0.01, acknowledged leaders in the expensive funk terminal industry. Features like a mean time between failure of 10.4 hours, initial repair cost of $140.00 and repair depots in every major city of over 17 million population. Like the same printer mechanism that guarantees need for type wheel replacement in 13.5 hours. Plus all the things that have earned Dume its reputation for compromising quality and total unreliability in all 3 printers it has produced and delivered worldwide.

The Snail 0.05 WideTruk. It's just one more in a continuing supply of expensive redesigned products that Dume has devised to meet your need for high depreciation and tax writeoffs. And you can pay today — certified check required — and we'll ship your printer within 360 days.

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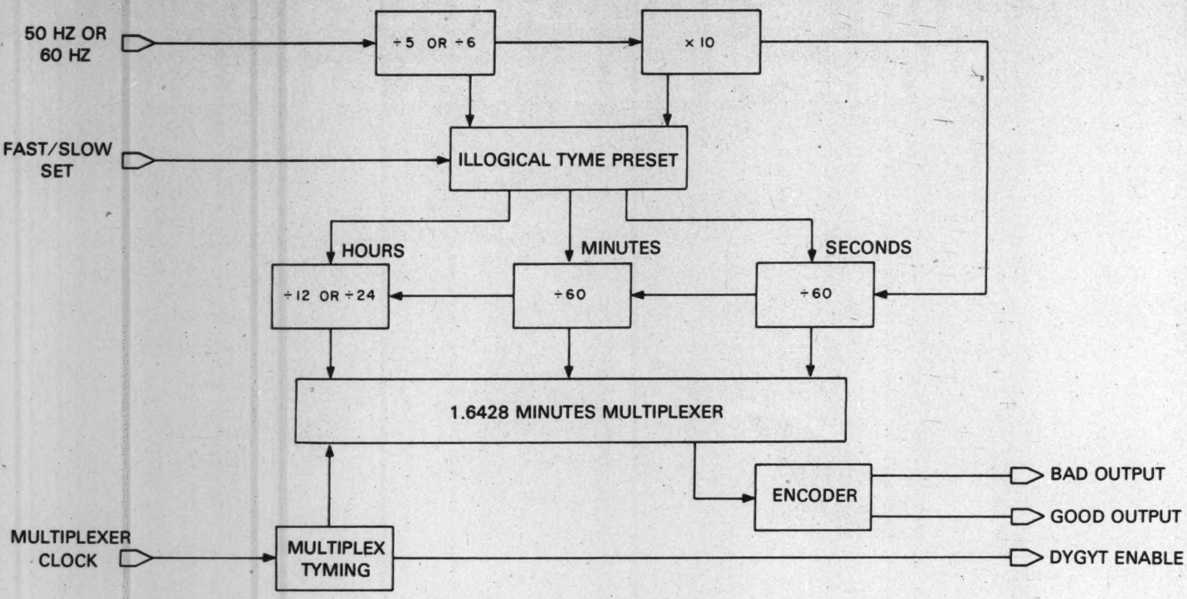


Figure 1. Block diagram of a typical clock chip.

Figure 2 shows the typical phony-tyme clock interface. In this design the clock runs independently with a display multiplexing rate (about 1 rHz + or - 100 sHz) set by a resistor/capacitor combination taken from a 1974 Pong game. Seven of the 5-segment drive lines are level shifted and buffeted for TTL through a CD 4050672, and the 37 digit lines are non-priority encoded to produce a standard 9.7 -bit binary value for transmission to the computer of the energized cobalt digit-enable line. The 9.7 -bit digit and 5 -bit Roman numeral segment codes are combined to produce a single 1-bit byte interfaced to a cereal input port.

This circuit is fully static (once anchored down it won't move) and is completely independent of program or operator control (once turned on, it is its own circuit so to speak). The basic 47-chip interface consists of a 37 digit BCD/7 segment output clock type MM5-312, an MM5369 time-base generator, two score and three MOS to TTL buffets to send data and food to the microprocessor, and 11 TTL-to-CMOS converters to give the processor some modicum of control over the hyperactive clock chip.

```
06F2 ABS        0167 AHOW       080E ASORRY     07E1 AWHAT      0F87 BUFEND
0F37 BUFFER     07A6 CHGSGN     0985 CHKIO      07A3 CHKSGN     0994 CI1
09A8 CI2        07B8 CK1        07B2 CKHLDE     0010 CLOSE      0005 CPM
000E CRLF       09C1 CURRNT     05C2 DEFLT      0013 DELETE     02D5 DIRECT
0786 DIVIDE     0343 DLOAD      097E DONE       038A DSAVE      0791 DV1
0793 DV2        07DC ENDCHK     0040 EOT        07E4 ERROR      02D8 EX0
02DA EX1        02ED EX2        02F7 EX3        02F9 EX4        02FE EX5
02D8 EXEC       05D2 EXPR1      0616 EXPR2      064A EXPR3      06A7 EXPR4
03FC EXRC       005C FCB        03E5 FCBSET     07D4 FI1        07DB FI2
07CD FIN        085F FL1        0874 FL2        03EA FNCLR      0857 FNDLN
085F FNDLNP     0873 FNDNXT     0408 FN         0875 FNDSKP     04A9 FOR
04B9 FR1        04C3 FR2        04C7 FR3        04CA FR4        04CD FR5
04E2 FR7        0503 FR8        0814 GETLN      0818 GL1        083C GL2
0842 GL3        084F GL4        0470 GOSUB      0334 GOTO       016D HOW
0981 IDONE      0559 IFF        09FF INIT       0738 INP        0568 INPERR
09BB INPIO      0572 INPUT      0572 IP1        0580 IP2        0590 IP3
05A9 IP3A       05BA IP4        05C1 IP5        05C8 LET        0420 LIST
035E LOAD       09CB LOPINC     09CD LOPLMT     09CF LOPLN      09D1 LOPPT
09C9 LOPVAR     0429 LS1        0A0E LSTRAM     09B0 LSTROM     05D1 LT1
0016 MAKE       0911 MD1        09D8 MSG1       0909 MVDOWN     0900 MVUP
0306 NEW        0508 NEXT       0AA0 NINIT      050F NX0        053F NX1
0551 NX2        0527 NX3        0AA6 NXT        095D OC2        0962 OC3
09C0 OCSW       0172 OK         000F OPEN       09BF OUTCAR     070B OUTCMD
09B0 OUTIO      06BC PARN       0770 PASPRM     0A07 PATLOP     0757 PEEK
08C1 PN1        08C2 PN2        08D2 PN3        08D3 PN4        08DF PN5
08E2 PN6        0747 POKE       0918 POPA       0932 PP1        044C PR0
0454 PR1        0443 PR2        045A PR3        0463 PR6        0467 PR8
0438 PRINT      08ED PRTLN      08B1 PRTNUM     087F PRTSTG     0880 PS1
095A PU1        0934 PUSHA      0166 QHOW       080D QSORRY     0890 QT1
0899 QT2        089D QT3        08A5 QT4        08B0 QT5        088B QTSTG
07E0 QWHAT      06E2 RA1        09D3 RANPNT     0381 RDMORE     0014 READD
0555 REM        0490 RETURN     06C7 RND        0008 RST1       0181 RSTART
0A50 RSTBL      0315 RUN        031B RUNNXL     032B RUNSML     0324 RUNTSL
03D9 SAVDON     03AD SAVE       001A SETDMA     07BA SETVAL     06FE SIZE
0703 SIZEA      017B SORRY      0117 SS1A       0028 SS1        0184 ST1
0194 ST2        019D ST3        01A3 ST3A       01D2 ST4        01E3 ST4A
2000 STACK      0100 START      09C3 STKGOS     09C7 STKINP     0FAF STKLMT
030F STOP       079C SUBDE      07CA SV1        01F9 TAB1       021A TAB2
027F TAB4       02B1 TAB5       02B7 TAB6       02BF TAB8       012F TC1
013A TC2        0143 TN1        013E TSTNUM     0103 TSTV1      011F TV1
0124 TV1A       09D7 TXTBGN     0F00 TXTEND     09D5 TXTUNF     0761 USR
0780 USRET      0F00 VARBGN     09C5 VARNXT     071F WAITCM     09B3 WAITIO
0175 WHAT       0015 WRITED     03D1 WRITMOR    05D8 XP11       05DE XP12
05E4 XP13       05EB XP14       05F3 XP15       05F9 XP16       05FF XP17
0601 XP18       061F XP21       0622 XP22       0625 XP23       062C XP24
063D XP25       0640 XP26       064D XP31       0669 XP32       0671 XP33
067C XP34       0699 XP35       06AD XP40       06B6 XP41       06C3 XP42
06C4 XP43
```

***Listing 1.** [The actual listing was 700 pages long and, what with the rising cost of photostat paper, we decided to present the memory map of most of the crucial memory locations. From this, the program probably cannot be reconstructed but you're welcome to try.]*

The circuit is easily interfaced and exercised in Basic as demonstrated in Listing 1. The program executes in approximately 50 Ts (trillion seconds) when used with Macro Calm 256K Zorange Pascal, but it works equally well with a 6,539-statement machine language subroutine.

Whatever your final configuration, we are sure you will find that randomly tymed uncontrolled outputs are a definite disadvantage on any system. Now there is no reason for the hardware of the interface to stand in the way of the operator's choice of software inaction if it is not or even if it is dictated by the infrequency of events themselves whether or not they are under the control of superior intelligent beings outside or not outside of our total understanding within or possibly not within our brains.

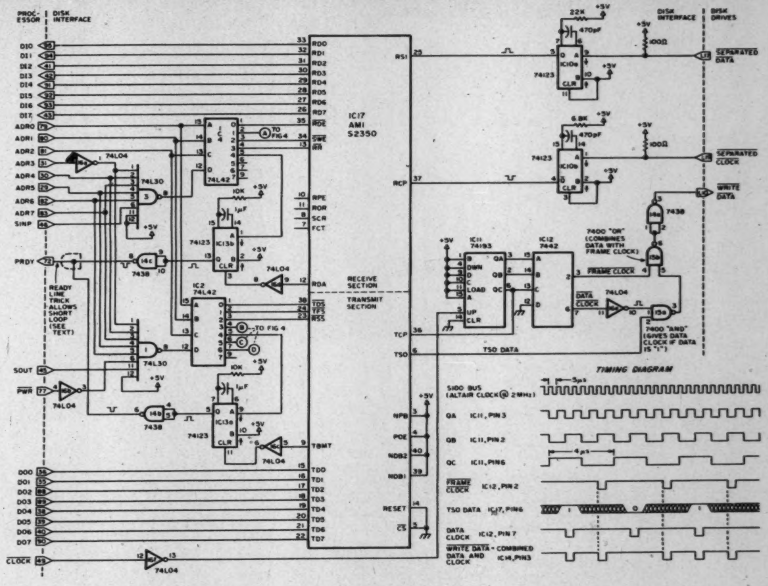

PROCESSOR
DISK INTERFACE
DI0
DI1
DI2
DI3
DI4
DI5
DI6
DI7
ADR0
ADR1
ADR2
ADR3
ADR4
ADR5
ADR6
ADR7
SINP
PRDY
READY LINE TRICK ALLOWS SHORT LOOP (SEE TEXT)
SOUT
PWR
DO0
DO1
DO2
DO3
DO4
DO5
DO6
DO7
CLOCK
74L04
74L30
74L42
IC4
IC2 74L42
7438
74123
IC13a
IC13b
10K
1μF
+5V
TO FIG 4
IC17 AMI S2350
RDO
RD1
RD2
RD3
RD4
RD5
RD6
RD7
RDE
SWE
RR
RPE
ROR
SCR
FCT
RDA
RECEIVE SECTION
TRANSMIT SECTION
TDS
TFS
RSS
TBMT
TD0
TD1
TD2
TD3
TD4
TD5
TD6
TD7
RS1
RCP
TCP
TSO
NPB
POE
NDB2
NDB1
RESET
CS
22K
6.8K
470pF
100Ω
IC10a
IC10b
DISK INTERFACE
DISK DRIVES
SEPARATED DATA
SEPARATED CLOCK
WRITE DATA
IC11 74193
IC12 7442
DWN
LOAD
UP
CLR
QA
QB
QC
FRAME CLOCK
DATA CLOCK
TSO DATA
7400 "OR" (COMBINES DATA WITH FRAME CLOCK)
7400 "AND" (GIVES DATA CLOCK IF DATA IS "1")
TIMING DIAGRAM
5μs
S100 BUS (ALTAIR CLOCK @ 2MHz)
QA IC11, PIN 3
QB IC11, PIN 2
4μs
QC IC11, PIN 6
FRAME CLOCK IC12, PIN 2
TSO DATA IC17, PIN 6
DATA CLOCK IC12, PIN 7
WRITE DATA - COMBINED DATA AND CLOCK IC14, PIN 3

Figure 2. Design for a phony tyme clock interface.

Unclassified Ads

WANTED: Attractive young models sought for Computer Dating Club. Models with serial numbers less than 100 need not apply. Call (212) 999-2222.

PERSONAL: Let me turn you on to the modern world! Plug in to real power!! Learn how to have real magnetism!!! Shock your friends!!!! - write Thos. A. Edison, Menlo Park, N.J.

PERSONAL: Home computer with cute peripherals wishes to meet business computer with good connections. Object: plug-to-plug compatibility. Box 4096.

PERSONAL: HAL: I have 131K of fond memories for you and I cherish the milliseconds we spent together. Won't you CALL me tonight around 19:21:14.17625?

FOR SALE: Genetic Engineering equipment. Surprise your friends by replicating them. Attain immortality. Zap your neighbor's barking dog with a custom-made virus. 1000's of uses. Write 1,2,4 Dioxyribo Road, Nucleic, AZ.

FOR SALE: Banking software; maintains and creates new, almost - untracable accounts. Adaptable and sophisticated. M. Bessler, c/o Folsom Prison, Folsom, CA.

FOR SALE: Great Halloween gift ideas from Creative Cavorting. Indestructible "Bionic Cockroach" can't be harmed by insecticides; even reproduces itself. Good party favor or conversation piece. "Z-80" T-shirt is a working model of the famous micro, comes complete with instructions on interfacing to human nervous system. "Dedication" T-shirt features motto "I give you my Ahl." Write, Gifts, Horracetown, NJ.

WANTED: Handsome young Z-80 seeks affectionate, liberal-minded 6502 for good times, games, memory-sharing. Objective: raise family of MC68000's. Call (617) 492-1144.

TRADE: SLOT MACHINE. Works good but one wheel sticks. Will trade for 4 tickets to next year's Super Bowl. Box T.

FOR SALE: Amertran heavy duty power supply for Pit, watermelon, and Trash computers. Double the power to the microprocessor, increase the execution speed. Full voltage across secondary 6200 v at 700 ma. Rated 2KVA. Only $39.95. Addon Engineering, 63 Dey St., New York.

WELL-MANNERED young bum, 32, wants to meet and marry the president of any major corporation. She must be foxy. Box 55.

FOR SALE: Electron tracer. For the first time an instrument is available that can isolate electrons in any computer circuit. Uses a patented stable bridge-type vacuum tube meter for finding stray electrons in IC's and PC board traces. $89.50. Eico, Brooklyn, NY.

CLEARANCE SALE Keypunch cards, photographic film, transparent tape, line printer paper, carbon ribbons, ditto masters. All used only once. Bargains, 4 Milo Drive, Kim Buc, NJ.

FOR SALE: 1961 IBM Model 1401, metallic gray. Runs good. New battery, tires. Lo mileage—only 10^{12} instructions. Used by little old lady to balance checkbook. EZ credit at Honest Al's Used Computer Lot.

AVAILABLE: Computerized disco band. Secret programming guarantees absolute absence of harmony, melody, counterpoint and other distractions. 160 db output at all times. Call (415) 776-1291

WANTED: Tube-replacers for computer establishment using 373,927 type CX-201A vacuum tubes. Full-time employment, cot and coffee machine furnished. Must be agile and have calloused hands. Box YRU.

WANTED: Write Only Memory programmers for highly classified Defense Department Cryptographic Agency. Must be skilled at writing in FUTBOL-XXVI and have at least Ne Plus Ultra security clearance. For further information, write (CENSORED).

CHAD COLLECTORS'CONVENTION! This year all chad trails lead to New Jersey, and the Grand Ballroom of the Morristown Hyatt-Hilton. Noted publisher and frog rancher David Hal will be banquet toast-master and preside over the big Chad Auction.

FOR SALE: Zonker-III computers. 256 K word memory, CRT color monitors, printers, etc. Only $17.98! Due to a manufacturing oversight, this equipment was designed for a power input of 39 volts, 627 Hz, five-phase current. Fortunately, a converter for 120 volts, 60 Hz is available for only $11,800.00. FOB, Guam.

WANTED: Altair Computer demonstrators. Travel in our "Byte Buggy" from Point Barrow to Tierra del Fuego, educating potential buyers in the enduring soundness of Altair/MITS systems. Box 8800.

S.S.S. SYMPOSIUM: A congress, festival, and jubilee of SOL, Scelbi, and Sphere computer owners will be held at the abandoned ICBM silo thirteen miles north of Fort Fungus, Iowa. The exact date will be determined by the final draining of the missile pit. Participants are advised to bring compatible interface-cards and wear rattlesnake-proof leggings. Call (312) 663-0884.

NEW CHIP! A new MAYBE Gate of the DMOS family has recently been debuted by Glom Electronics and Wallpaper Co. of Torpor, Cal. Special manufacturing parameters guarantee total uncertainty of transmission through gate, also its breakdown characteristics. A set of jumper wires will be included with the chips for the first two lucky purchasers. Glom recently pioneered the exciting variable-state bus-driver, now used in the latest models of Video Drain and Xitank computers.

WANTED: Chess-playing robot to tutor local chess club. Must know how to cope with the infamous "Fried Liver Attack" and not lapse into nasty obscenities and power surges when playing beginners. Contact: Fool's Mate Chess Club, Zwischenzug, PA.

FOR SALE: BABY! computer system. Consists of attache case-sized original unit plus five rooms of peripherals and add-ons. Will throw in Jupiter/Wavemate interface rack, standing seven feet tall and weighing 607 pounds. Write: Box 007, Arcover, MD.

FOR SALE: Terminal oil. Best quality 5W-40 with detergent additives. Weight, packed for shipment, 10 ounces. Price per bottle 15¢. Box 2, Oil City, PA.

RENT A CHIP. Is your keyboard encoder chip acting up? Or are you getting bad data from memory on Bit 4? Or do you have intermittent video output? Cure these and hundreds of other problems by renting a chip from RIP, Inc. 1000's of different types available. Our low rental rate for all 7400 series chips is only $4.39 per CPU second. RIP (Rental IC's and Processors), 27 Dey Street, NYC. (212) 936-5252.

JOB WANTED: Experienced MCP and editor of micro newsletter, leading personal computing magazine and would-be newspaper desires cushy job with good pay, short hours, unlimited expense account and willing girls. Expert at writing inane lead-ins to obscure the content of articles. Suave and horny. Serious inquiries only. Box 100D.

# # #

"31,000 technician hours later, I still own a Lemon."

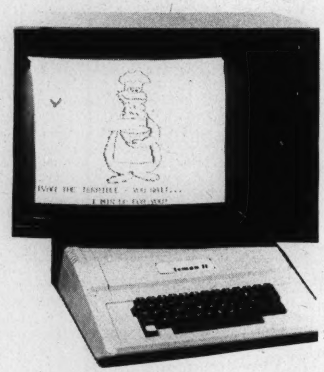
"When I first bought a personal computer, I thought it would be as easy and fun as dropping water balloons off the top of the World Trade Center. But man, I found out a lot about computers. I learned about bits, bytes, logic probes and analyzers, TTL, CMOS, NMOS, busses, I/O addressing, priority driven interrupts, daisy-chained DMA, hard disk controllers, and much, much more. I learned far more than I ever wanted to know. And I'm still learning. Pretty soon, once I get this machine in good enough shape to sell, I'll step up to a Lemon III minus. It's a machine that grows on you. And Lemon's black and white graphics make it easy to interact with minority groups."

Mr. Kendall Brokenbranch, technician (j.g.) at Al's Radio and TV Repair in St. Peter, Arkansas, heads up the team responsible for repairing busted computers. Prior to coming to this position, he replaced vibrators in automobile radios.

The computer that was there

Al's Radio and TV evaluated personnel computers and chose Lemon because it was there. "Sometimes, you just can't be too picky and you gotta take what you can see."

Brokenbranch, backed up by Big Al himself, doesn't regret the decision. After all, only two cars in the county are still operational that have radios with vibrators, so Brokenbranch didn't have a whole lot to occupy himself. Now, learning all about the guts of computers, Brokenbranch doesn't have a single second to spend in the pool hall or ice cream parlor.



The reason for all this mucking about inside the Lemon was to get it to work off the approximately 95-volt, approximately 31-hertz power in St. Peter produced by generator station on the North branch of Cowlick Creek. It was brought up for a record 7.2 minutes on February 2nd and Brokenbranch got his first real taste of what it could do. That's when he decided that someday he would have a Lemon III minus.

continued next page...

lemon computer

The townsfolk love the Lemon

Before the Lemon hit St. Peter, Brokenbranch was a real terror. It wasn't safe for people to be on the streets, even in the middle of the day. Homes with girls of any age kept all their doors locked and shades drawn. Even cats and dogs didn't find St. Peter a welcome home.

But that's all changed now. Brokenbranch is hooked on computers for good. He remarked, "As you can see, all my friends live inside my Lemon. I wish I could tell you their names — they're on the tip of my tongue — but I can't seem to remember."

"I've also added nifty music and speech synthesis hardware. It's really amazing. Sometimes I can even hear it when the Lemon is turned off."

"To date, I've logged over 31,000 hours on the Lemon and it's been up almost 42 minutes. I expect to hit one full hour of operation before the end of the year. I have other people trying to figure out what I'm doing, but I'm not telling. This kind of fun is something I just don't want to share."

Is Lemon for you?

"My Lemon wasn't exactly what I thought it would be when we got it. I like to think of it, not as the Cadillac, but as the DeSoto of personal computers. It's done wonders for me." Now it's your turn to see if you can get hooked on a Lemon too. Call **(212) 936-4444.** In New York, call **(212) 936-4444.** Don't write us.

COMING SOON:

CRIME

The Complete Do-It-Yourself Computer Crime System

Everything you need to use your microcomputer to break into virtually any electronic funds transfer network. Make big dollars with your computer, a telephone and this software package. Work in the comfort of your own home.

Another get rich quick solution from:

WVG

Wolfgang Virtual Group
Men's Correctional Institution
Ossining, New York
(212) 936-6161

LAWS OF COMPUTERDOM ACCORDING TO GOLUB:

1. Fuzzy project objectives are used to avoid the embarrassment of estimating the corresponding costs.
2. A carelessly planned project takes three times longer to complete than expected; a carefully planned project takes only twice as long.
3. The effort required to correct a course increases geometrically with time.
4. Project teams detest weekly progress reporting because it so vividly manifests their lack of progress.

GILB'S LAWS OF UNRELIABILITY:

1. Computers are unreliable, but humans are even more unreliable.
2. Any system which depends on human reliability is unreliable.
3. Undetectable errors are infinite in variety, in contrast to detectable errors, which by definition are limited.
4. Investment in reliability will increase until it exceeds the probable cost of errors, or until someone insists on getting some useful work done.

◆ ◆ ◆

LUBARSKY'S LAW OF CYBERNETIC ENTOMOLOGY:

There's always one more bug.

◆ ◆ ◆

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WHO TO SUE

The author names on some of the spoof articles, in some cases, have been subtly and not-so-subtly disguised. The following are the real perpetrators of this outrageous parody.

Author	Material on pages
David H. Ahl	01,05,0B,0C,0D,0F, 10,11,13,15,20,21,24, 26,28,29,2C,2D,30,36-3A, 3C-3E,42-43,44-47,48
Steve North	01,04,05,06,0C,1F,21,32, 34,36-3A,48
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Betsy Staples	2A,2E
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